ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E.
Technical Editor: C. O. BRETTELLE, M.I.E.E.
Industrial Editor: J. H. COSENS

29th October, 1948

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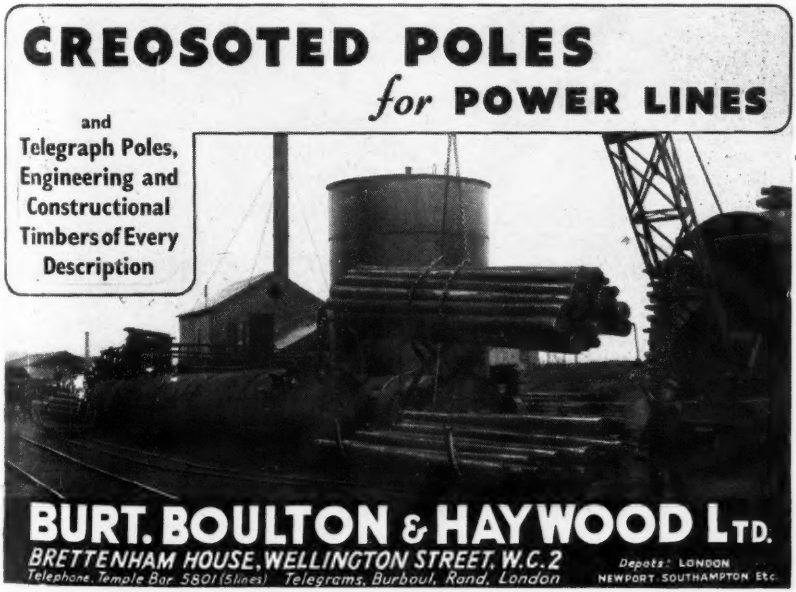
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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER

ESTABLISHED 1872

Vol. CXLIII. No. 3701
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Supervisors' Status

RECOGNITION OF KNOWLEDGE AND ABILITY

THE influence of engineers in shaping the requisite material basis of civilization is probably least adequately recognized in the case of what are commonly known as "supervisory grades." These are the men who possess the essential, and very British, quality of "getting down to brass tacks" in coping with the day-to-day applications of technical knowledge, in which all engineering thought finds its ultimate outlet.

Thus they must be capable of installing, operating and maintaining apparatus so as to fulfil the aim of designers and production engineers that it shall be reliable and efficient in service. They should know enough of manufacturing processes to suggest such practicable improvements in appliances as working conditions may indicate to be desirable. All this implies an ability to handle subordinates so that they are imbued with similar aims.

Remuneration and Authority

Shortcomings in any of these directions may have consequences serious enough to show up to non-technical managements willing to learn the false economy of any stinting in the remuneration of properly qualified supervisors. Nevertheless, even when the terms of appointment are attractive to suitable men, too often one finds that they are not given sufficient authority to make their decisions effective.

The problem of the status of supervising engineers—more urgent than ever in view of the claims of production for export and the increasing mechanization of industry—was tackled constructively, from a wide experience of the subject, by Mr. A. G. Ramsay in his presidential address to the Association of Supervising Electrical Engineers, which was reported in our last issue. His suggested classification into a few grades in regard to range of duties and remuneration would no doubt introduce anomalies in view of the different names given to similar duties and *vice versa* and the varying degrees of responsibility allowed, but no feasible alternative is apparent to us.

Achieving Professional Standing

Specialized knowledge is, for instance, called for in many works processes, but a common engineering background should go far to secure sufficient flexibility to enable a man to improve his position or enlarge his experience if he wished to do so.

An incentive to the laudable ambition to achieve professional status would be given if the attainment of Swann Diploma standard with its excellent oral test of a candidate's ability "to set about a job" were accepted as conferring at least part exemption from A.M.I.E.E. examination requirements. Apart from this, more advantage might well be taken of the associate grade of Institution membership by those less well equipped academically.

The wide range of duties of supervising electrical engineers, which necessarily covers a good deal of mechanical and other branches of engineering, provides a basis for Mr. Ramsay's submission that their position would be materially strengthened if supervisory engineers of all kinds were in one organization. That would in effect

mean extending the scope of the A.S.E.E., since the latter with its thirty-five years' experience under the guidance of presidents eminent in various fields of engineering would be the natural leader. The working out of a comprehensive scheme, involving negotiations with established bodies would be a complex matter—much more so than the organization of electricity supply engineers, for example, who had a virtually clear field and whose duties (including many labelled as mechanical) were generally similar in different undertakings and fully understood by technical managements. None the less, although the object may not be quickly or easily attained, Mr. Ramsay's suggestion is one that will merit the serious consideration it will no doubt receive during the coming winter by the members, who will doubtless bear in mind that administrative authorities of whatever kind more readily negotiate with large representative bodies.

ELECTRICITY SUPPLY TRAINEES

WITHIN the next few years many of the most experienced men in the electricity supply industry will have reached retiring age. No doubt, with a view to securing worthy successors in the greater numbers required for the increase in electrification consequent on the provision of adequate generating plant, the B.E.A. and Area Boards have drawn up the training scheme of which particulars are given on page 665. While the educational standards required are rightly of a high order, the scheme also eases the path of engineers with practical experience whose conventional academic training has been hindered by war service.

ELECTRICITY FINANCE

BRITISH Electricity Stock to a total of £335 million was created and issued as compensation to holders of stocks and shares in the companies taken over by the British Electricity Authority. The further issue of 3 per cent stock last week, amounting to £100 million is needed by the Authority to finance its own programme of plant construction and transmission and the Electricity Boards' developments. There were doubts whether an issue of this size could be "digested" but the terms offered were so favourable as to ensure full subscription. It is of interest to be reminded by the prospectus that the Authority acquired assets worth £800 million when it assumed control of the industry; it also took over the capital liabilities of the municipal undertakings and the Central Electricity Board.

KINGSTON "B"

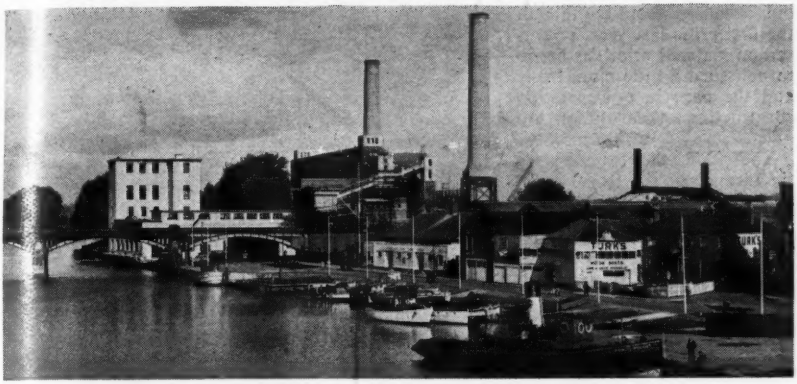
THE new Kingston power station is expected to require 1¼ lb of coal per kWh sent out. This is to be expected from its steam conditions and the capacities of the generating units, and the merit of its performance will depend upon calorific value. The statement made to the press that the cost of production will be 0·6d. per kWh is likely, without qualification, to mystify a public asked to pay more for its electricity, especially when a comparison is implied between the fuel consumption at Kingston, running at about 70 per cent load factor and at the stations it is said to relieve. As 2¾ lb per kWh is given for the latter, presumably these are peak-load stations only (and as such will still be required), whereas the average for all grid connected stations is only about 1½ lb.

OVERHEAD LINE CONSTRUCTION

IN his chairman's address to the I.E.E. Supply Section, Mr. C. O. Boyse signalized the altered scope of the Section by bringing power stations into his survey of technical developments. His references to overhead line construction were a personal contribution of more than passing value, particularly in regard to maximum working stresses and design loads and to conductor vibration. His views on the need to keep codes of constructional practice, which should be voluntary, separate from basic regulations will, we believe, meet with general acceptance.

WASTE-PAPER RECOVERY

A FURTHER national waste-paper contest is announced by the Waste Paper Recovery Association, 52, Mount Street, London, W.1. This will cover the period from October to March inclusive and prizes totalling £6,000 will be awarded to municipal councils showing the best results. Industrialists can help their local authorities considerably by organizing effective collection systems in their works and offices.



Kingston's Royal Inauguration

A Memorable National Occasion

LAST Wednesday Their Majesties the King and Queen visited Kingston-upon-Thames to open the first power station to be completed since the British Electricity Authority assumed control of the electricity supply industry in April last. Very special efforts had been made to complete the first instalment of the station for the Royal opening and there is no doubt that these efforts were very successful, reflecting great credit upon all engaged in the work.

In a brochure produced for the event Lord Citrine, P.C., K.B.E., chairman, British Electricity Authority, writes: "The opening of the new Kingston power station by His Majesty the King is a particularly memorable occasion, and a significant one in the development of the plans of the British Electricity Authority."

The new power station at Kingston-on-Thames opened by H.M. The King on Wednesday will have an ultimate plant capacity of 120,000 kW

In looking forward to the occasion our thoughts have been running along similar although even broader lines to what we have just quoted. We have seen the Royal opening of Kingston power station as an event of wide national importance, rather than a local or national purely electrical event.

We think the new Kingston power station is a very good engineering job indeed, with a well selected site, stable design and first-class construction. By itself, however, it does not represent any greatly outstanding advance or achievement, technical or otherwise. In design it is of moderate ultimate capacity, 120,000 kW, and the initial contribution of 30,000 kW, while most useful, is really quite small. It is a "straight" engineering job with steaming conditions of 625 lb/sq in. and 850 deg F, and other features all of which belong to a field which was generally accepted as "good standard practice" before the war.

Considered more broadly, however, the power station represents an extremely important development in our national life. During the past few years we have all been forced to see the naked truth that the only road to recovery from the blow the war dealt us is that which leads to greater and ever greater production. All production managers and their like have for long appreciated that by far the greatest single contribution, apart from the virtues, to increased production generally is brought about by electrical development along its many paths—a fact which became more and more apparent as production became more and more intense during the war years. This they have known while they have had to witness not only the restriction of electricity supply from existing sources, but the construction work on our new power stations brought almost to a standstill because priorities for materials for power station construction could not be obtained. That was a maddening picture, and relief came

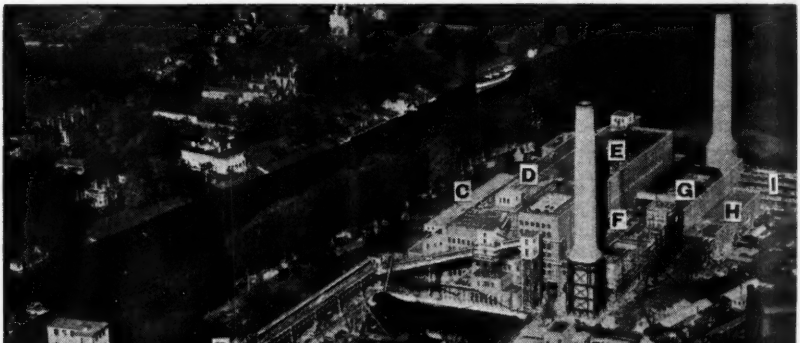
only when, at about the time of the fuel crisis last year, power-station material priorities began to be issued a little more freely and the pace in power-station construction thus began to quicken.

Therein lies the real and stern significance of the Royal event at Kingston this week, and if there is a little truth in the reports which increased as the time for the opening at Kingston got nearer, that priority was being given to Kingston at the expense of the work on other stations under construction, perhaps the grievances can be softened by the knowledge, in the light of the broader picture we have tried to present, that Britain's Royal post-war power station is now in commission.

The station as we saw it for our construction article —12th March, 1948

But we certainly have no wish to under-rate the honour bestowed upon the Royal Borough of Kingston-upon-Thames this week. Indeed a great deal of Kingston's effort is reflected by the occasion, for up to 1st April this year the development of the new station was part of the long period of progressive work of the Kingston Corporation electricity undertaking under the last borough electrical engineer, Mr. E. J. Jarvis, and his predecessors.

It is now our policy to describe each of the new power stations in two parts, one at an appropriate time during the construction, depicting the constructional features and layout, and the other after commissioning and the overcoming of "teething troubles",



In contrast with the top illustration, very definite changes in appearance result from the completion of the main buildings, coaling dock, south chimney, etc.

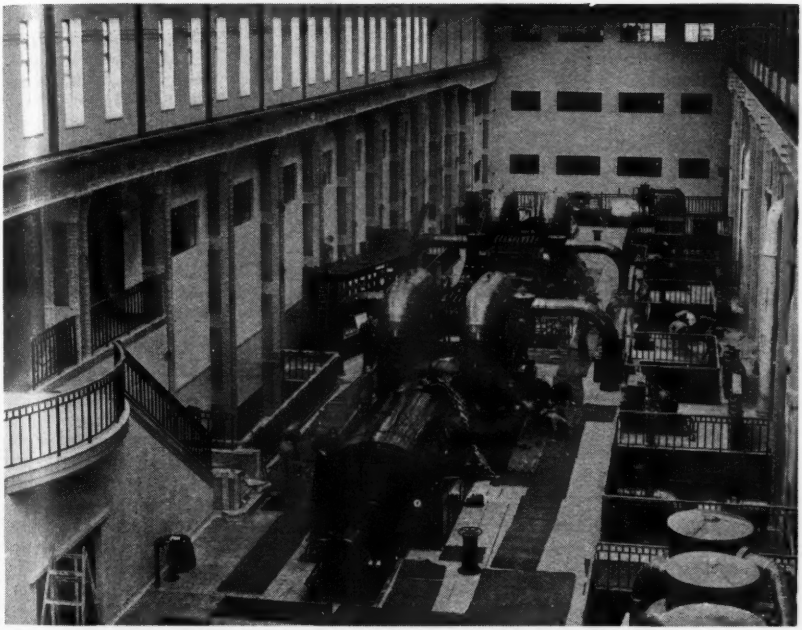
A.—Coaling dock. B.—Coal and ash conveyors. C.—Transformer bays. D.—Turbine house. E.—Boiler house. F.—Air preheaters and forced-draught fans. G.—Electrostatic precipitators. H.—Induced-draught fans. I.—Workshops. J.—Switch house. K.—Coal store. L.—Old power station. M.—Control room

in which the station's operational aspects are covered in some detail.

The constructional article for the new Kingston station was published in the *Electrical Review* of 12th March, 1948. We are unable, and in any case we consider it too early, now to prepare an operational description as we would wish to present it, but we look forward to the opportunity to do so later on, as part of the general plan to which we have referred.

We wish, however, the inauguration by the King and Queen to be suitably marked, and this we propose to do mainly by our foregoing comments on the vital and broader significance of the event, by outlining the principal features of the installation and by depicting the advances made in construction since our description last March.

Although the conception of the station dates back to 1939 when the Kingston electricity undertaking received a direction from the Central Electricity Board for the construction of a new station, actual work on the site did not start until 1945. Preece, Cardew and Rider were appointed consulting engineers, with Coode, Vaughan-Lee, Frank and Gwyther as civil engineering associates. The design provided for a total capacity of 120,000 kW and visualized two-shift working with the bulk of the output exported to the grid.



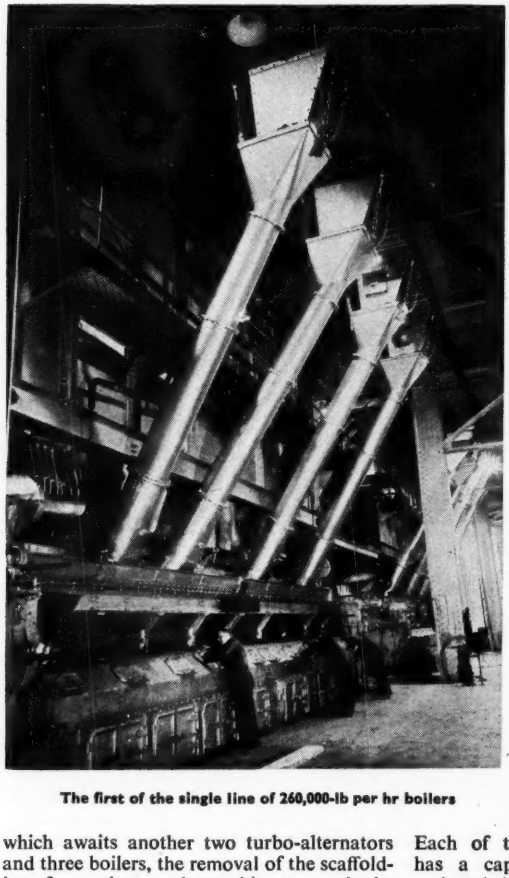
The first two 30,000-kW turbo-alternator sets have been installed

An outstanding feature of the station is the unusual attention given to the æsthetic aspects. This has meant considerably more than architectural consideration of the surroundings. For instance, on the east side of the main buildings an independent steel-framed brickwork screen wall has been erected to the full height of the electrostatic precipitators, largely to mask the external duct connections. Then there is the very special care which has been and is being taken during construction to preserve the trees and general amenities of the popular riverside Canbury Gardens which are situated immediately west of the station.

The special outside architecture of the crane house over the coal dock and of the enclosed

arch over Canbury Gardens, carrying the coal conveyors, are also among the special schemes which have been introduced to preserve the amenities.

Perhaps the only major change in the general lay-out since our earlier visit for the construction article is that the northern block, outside the unloading bay, now constitutes the headquarters of the South Eastern Division, B.E.A. Very definite changes in appearance, however, result from the completion of the south half of the main buildings



The first of the single line of 260,000-lb per hr boilers

which awaits another two turbo-alternators and three boilers, the removal of the scaffolding from the southern chimney, and the erection of the crane house and gardens archway already referred to.

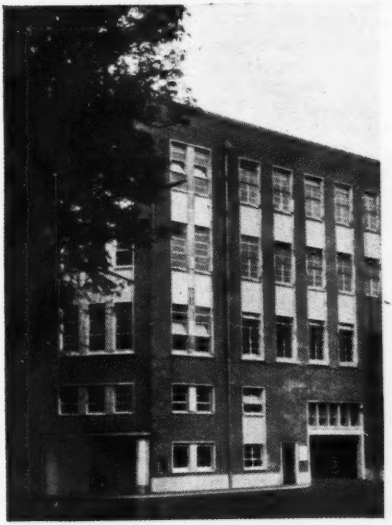
To define the location of the station perhaps the reference to Canbury Gardens is sufficient to many Thames lovers, but to others we would say the station is on the east bank of the Thames where the river has a north and south course in the Kingston Borough area, and that it is just north of the Kingston railway bridge and on the site of the original Kingston sewage works.

The best way of relating the new and old stations is to say that the old station occupies the south-east corner of the new station site, which may be our first contribution to a description of the site layout. A 25,000-ton coal store occupies the south-west corner. On concrete foundations generally down to 15 ft below ground level, the main buildings run almost due north and south and occupy practically the whole of the north half of the site. Between the main buildings and the old station on the east of the site are the existing 33-kV switch house and the grid substation.

The main buildings measure about 430 ft long and 320 ft wide, and the general basement and operating levels are 17·5 ft O.D. and 40 ft O.D., respectively. The turbine house is on the west side and has c.w. pump and transformer bays to the west and a feed-pump bay to the east. The turbine house opens out direct to the firing floor of the boiler house at the 40 ft O.D. level, and to the east the boiler house bays and annexe house, respectively, preheaters and f.d. fans, precipitation plant and i.d. fans.

We will now deal briefly with the plant in the "production-flow" order and assume completion of the station. For the crane house over the coaling dock an enclosed conveyor system extends to the boiler house bunkers which have a total capacity of 2,000 tons. Each of the six Stirling tri-drum boilers has a capacity of 260,000 lb/hr (m.c.r.), and each boiler plant is complete with twin Babcock & Wilcox chain-grate stokers, Senior gilled-tube economizers, Howden-

Ljungström air preheaters, James Howden i.d. and f.d. and secondary-air fans, and Lodge Cotterell electrostatic precipitation plant. The boiler, superheater and economizer heating surfaces are 12,517 sq ft, 9,810 sq ft and 42,120 sq ft, respectively. Considerable automatic control is provided by James Gordon equipment which is mounted, with the precipitation-plant controls, on the wings of an Electroflo boiler instrument board for each boiler, which also carries a comprehensive range of gauges, indicators and other instruments, as well as auxiliaries starting equipment in its desk portion. A steel-plate main flue mounted on the roof of the air preheater house connects both chimneys and receives the gases from the precipitation units (two per boiler). A Hydrojet ash-handling system sluices the ash and grit from the boilers and precipitators on to a crusher plant from which the solids are passed on to the coaling dock and the water is recirculated.



A major change is that the northern block now constitutes the headquarters of the South East Division, B.E.A.

The four 30,000-kW B.T.H. turbo-alternator sets are arranged end-on in line along the turbine house, while the 3,000-kW house set lies cross-wise at the north end. Each main turbine is a 3,000-r.p.m. two-cylinder impulse-reaction machine which is bled at five stages for feed-water heating and exhausts into Worthington-Simpson twin condensers. There are five motor-driven and two steam-driven Mather & Platt feed-water pumps, and as well as these and the heaters the feed system includes a unit evaporator for each set and a central live-steam evaporator, all Worthington-Simpson.

The twin condensers of each turbo-alternator set have a cooling surface of 26,000 sq ft and are served by two Mirrlees-Watson double-axial flow c.w. pumps, duplicate two-stage steam air ejectors and duplicate two-stage extraction pumps. Circulating water from the condensers is taken from the river, of course, the inlet and outlet being roughly opposite the south and north ends of the main buildings, respectively.

Generation is at 11 kV and the alternators are tied to 35,295-kVA 11-kV/33-kV Hackbridge transformers. The main switching is effected at 33 kV by Ferguson, Pailin vertical - isolation 500-MVA oil circuit breakers. The main switchgear is controlled from the suitably extended control room in the old power station because of the switching arrangements already in existence in association with the old station. Supplies at 3·3 kV and 400 V are available for the auxiliaries throughout the station via suitable step-down transformers and English Electric air-break truck-type switchgear. The 3·3-kV auxiliary switchgear is controlled from a control room above the turbine operating floor.

South African Trade

OFFICIAL returns of the import and export trade of South Africa have been issued for the first three months of 1947. Those relating to the electrical trade showed a big advance on the first quarter of 1946, the total for imports being £1,117,000 compared with £481,000. Items were as follows:—Batteries and parts, £130,000 (£76,000 in first three months of 1946); dynamos and generators, £117,000 (£7,000); motors, £164,000 (£99,000); transformers, £119,000 (£61,000); cable and wire (rubber insulated), £142,000 (£49,000); other cable and wire, £229,000 (£63,000); stoves and parts, £92,000 (£38,000); and lamp bulbs, £124,000 (£88,000).

Carbon brushes are now being manufactured in Johannesburg by a British firm of carbon specialists which opened branch works about a year ago.

Views on the News

By REFLECTOR

HALF the newspapers of Great Britain appear to have misunderstood Lord Citrine's remarks on the financial position of the British Electricity Authority. He mentioned that at the time of taking over the system about 150 undertakings were operating at a loss which, if allowed to continue, would have resulted in a loss of from £5 to £7 million. This was interpreted (rather joyfully I fear by some) as an announcement of an actual loss of the magnitude indicated, whereas by price increases the position has been rectified. Practically all of the papers published corrections when the error was pointed out, but it was unfortunate that *Reynolds News* had to put its correction under the big heading "Loss."

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Wordsworth's heart leapt up when he beheld a rainbow in the sky. I had a similar sensation when beholding the illuminated fountains in Trafalgar Square last week and so did many hundreds of thousands of others. For a comparatively trifling expenditure of money and energy all these people were given a real "lift" in these drab days. If the fountains are kept off the peak there seems to be no reason why they (and others all over the country) should not be a joy for ever—they are certainly things of beauty. At any rate they have been kept going for a further week.

◆ ◆ ◆

It seems that the position at Sheffield as regards electricity charges is worse than I said last week. Mr. J. R. Struthers has written to point out that the former rateable value charge of the two-part domestic tariff was 8¼ (not 12½) per cent. Another correspondent also corrects me on this and moreover gives some details of his own charges. His standing charge jumps from £4 3s. 4d. to £7 10s. per annum and where he was paying 0·45d. per kWh (it was ½d. up to 1946) he is now asked for 0·65d. for three-quarters of the year and 1·1d. during the winter quarter. He says that the impost will certainly have the effect of reducing domestic consumption but it falls rather heavily on the "all-electric" householder. In any event the proportion of domestic supplies to industrial power is small in the area of the Yorkshire Electricity Board. My correspondent does not agree that the rateable value method of assessing the fixed charge is unsatisfactory; it provides, he says, a basis which does not need frequent checking up of properties by the supply authority.

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"Talking of Windmills" is not a dissertation on wind power, which is now being investigated, but a pamphlet which the South Eastern Electricity Board is sending to all its customers. The frontispiece is a good picture of the Union Mill at Cranbrook, Kent, and the idea presented in the pamphlet is that as in former days no wind meant no power so to-day plant shortage means curtailed power. Consequently endeavours must be made to reduce demand to match plant capacity and means of accomplishing this are suggested. Put in a very reasonable way these suggestions should be acceptable to the wise consumer who is more appreciative of reasoning than mere exhortation.

◆ ◆ ◆

From the depths of banality to the heights of poesy range the slogans used by advertisers and it is instructive and amusing to see 6,000 of them brought together in a dictionary. This is "Slogans: The Copywriters' and Advertisers' Handbook" compiled by the Fleet Street Group, Ltd., and published at 30s. by Day's Publications & Services, Ltd., 93/4, Chancery Lane, W.C.2. Its purposes are to enable advertisers to avoid plagiarism and to provide them with inspiration. I am glad to be able to say that the electrical slogans included in the book are generally of a high standard, sensible and forceful, which cannot be said of many others.

◆ ◆ ◆

Alliteratively, Reigate is associated in my mind with rebates. For a number of years the electricity undertaking made an annual gift to its consumers in the form of a rebate of, if I remember aright, about 20 per cent, and it became a matter of speculation how long this could continue in the face of rising costs. All that, of course, is now a thing of the past, but I am pleased to see that the history of the undertaking is placed on record in a neat little illustrated booklet. In earlier years the citizens were able to get their electricity even cheaper still, for the Council offered a supply free for six weeks in order to get custom—a very effective scheme.

Electro-Metallurgy

Improvements in Technique and Equipment

By L. SANDERSON

DEVELOPMENTS in the metallurgical use of electricity include better strain gauges allowing of very short gauge length and measurement of rapidly fluctuating stresses. Great cost reductions are being achieved with increased safety and service, by the redesign of welds and castings on the basis of measurements taken with improved equipment. The use of X-ray diffraction in measuring strain is likely to increase, making it feasible to measure not only change in strain but also absolute strain, which will simplify the study of locked-up stresses. Moreover, the possibility of using a gauge length of the order of 1/100 in. will make the study of stress concentration much easier.

Among advances in metallurgy affecting electrical instruments and plant, wire of 0·01 to 0·0001 in. diameter and even finer is being made in gold, silver, platinum and other alloys for radio, radar, electronic tube grids and filaments, X-ray work, etc. Platinum fuse wire has been reduced to 0·000017 in., about 1/1,000 of the diameter of a fine hair. Sound recording wire of about 0·004 in. is being made in music wire and in alloy grades.

Modern electrical plant plays its part in new techniques in the brass industry. For melting the alloys the low-frequency induction furnace is giving place to larger units. Double- and even triple-channel furnaces are coming into use, some with inputs of above 400 kW, resulting in higher productive capacity, more uniform composition and slightly lower cost.

Inspection Methods

Magnetic particle inspection of parts has usually been carried out with regular d.c. supplied by storage batteries and full-wave, three-phase rectifying systems, or ordinary a.c. correctly transformed and regulated. Equipment providing half-wave single-phase rectified current for magnetization is now increasingly used for inspecting welds and castings. It is more economically constructed and makes the inspecting medium more mobile, with easier formation of indications and location of deeper sub-surface defects. For inspection of large forgings and castings, plant delivering up to 15,000-A low-voltage d.c. is employed.

A furnace for melting and casting metal in vacuum has been developed consisting of a high-frequency coil, a melting crucible and a mould, all enclosed in a vacuum-tight shell of non-magnetic steel. The mould is held in a cradle suspended from the trunnions on which the entire furnace is tilted to pour the charge, therefore it remains vertical. The pressure inside the furnace is about 200 microns of mercury at the start of the run, and increases to about 1 to 2 mm when the melt is teemed at 1,400 deg C. A controlled atmosphere can be maintained at any pressure up to atmospheric instead of a high vacuum.

Co-ordinated Machine Tool Drives

Equipment and systems are being designed to furnish co-ordinated drives for machine tools, while the use of adjustable-voltage drives is extending. Such systems, using d.c. motors and either unit-frame a.c.-d.c. motor-generators or electronic sources of power, provide wide, stepless speed ranges, often eliminate bulky gear units and are simple to operate. Various degrees of speed regulation and flexibility can be obtained. With a special d.c. motor a unique field arrangement can operate over a speed range of about 8 : 1 from a constant d.c. power supply, rendering unnecessary a motor-generator and an adjustable-voltage system for obtaining the required speed range from 4 : 1 to 8 : 1.

Electrical tracer mechanisms for contour milling and similar operations are being embodied in axle-turning lathes, die-sinkers, milling machines, etc. A probe for following a model, an electronic amplifier, a d.c. feed motor and an a.c.-d.c. motor-generator are used and the "following" ability is highly accurate. For handling materials, adjustable-voltage systems provide a stepless range of speeds for conveyors using either an electronic or a motor-generator driver, both of which work from an a.c. supply. Equipment supplied for cranes and hoists is primarily operated from a.c., but numerous systems for obtaining d.c. working properties are being studied.

Notable developments in spot welding of aluminium alloys include stored-energy machines to offset the heavy power demands of the ordinary single-phase machines. New methods of precleaning aluminium and

its alloys before welding eliminate the undesirable oxide coating. Welding tips and tip forms have improved, and the permissible number of welds per tip has risen from about 20 to 500 and 1,000 spots. Speeds have increased from 50 to 60 to about 150 spots per min. In flash welding the alloys, smoother flashing travel and a swifter upsetting movement are being obtained. Electronic controls used with resistance welding machines have been simplified, and improved circuits better withstand transient surges on the power supply line. Voltage and current compensators allow operation of welding machines on overloaded supply systems. There are precise electronic devices for the post-heating cycles required in welding the air-hardening steels, and new electronic controls for the stored-energy types of aluminium welding machines. A promising experimental method for assembling aluminium alloy parts is tungsten-arc welding in an atmosphere of argon. As no fluxes are employed in making the welds, flux cleaning is eliminated.

By regulation of the electro-plating process in the electroforming of nickel, this metal can be deposited on mandrels to the desired thickness. The deposit can be varied from a hard brittle material to a soft and ductile one. Electrodeposition of tin and zinc on continuous strip in steel mills has progressed. Thin electrolytic tin coatings should have great scope in containers for dry packing of materials.

Flame Control

Electronic flame control has revived the use of side-blown converters for making steel castings. An instrument records the luminosity of the flame and catches the end point of the blow more accurately, it is claimed, than the human eye. As it indicates when a boil is about to occur, so that the operator can reduce pressure promptly, blowing loss has been materially reduced. A new principle of induction heating employs a three-element gas tube for the conversion of 60-cycle into radio-frequency energy. Among its advantages are constant work-coil power output, stepless power control and inexpensive work-coil construction.

An electroplating process in which the current is reversed at short intervals is claimed to give a superior finish to copper, nickel and chromium plating. The current is applied for 2 to 40 sec to deposit a layer of metal, then reversed for 0·5 to 5 sec, to eliminate unsound or inferior metal. The surface is thus progressively smoothed and polished and the soundness of the deposit increases adhesion. The absence of polarization makes high plating speeds possible. For producing highly polished finishes the cost compares favourably with that of d.c. plating and hand buffing and polishing.

Low-carbon rimming steel is now made in 80-ton Héroult electric-arc furnaces. The charge is all scrap, and carbon is reduced solely by use of the oxygen lance. A new 125-kW induction furnace which melts finely divided aluminium alloy particles such as turnings, chips and unbaled foil operates on the twin-coil principle. Oxidation losses are said to be greatly reduced, and yields of 95 to 96 per cent of the dry weight of the charge are obtained by rapid melting and low hearth temperature. The electrical controls are concentrated in an internally wired, self-contained cubicle which also houses the temperature control. Another, 20-kW induction furnace melts small quantities of aluminium alloys, being mainly used as a holding furnace in die-casting and permanent mould plants. The bath is gently stirred, thus avoiding segregation.

Lightweight Electrical Machines

A new 35-per-cent cobalt, 64-per-cent iron, 1-per-cent chromium alloy will make possible compact electric motors and generators about 10 per cent smaller and lighter than those of equal power now built for aircraft. The combination of cobalt and iron is said to give the highest magnetic saturation point of any known metallic material, and the chromium makes the alloy workable. A new rolling method produces a tissue-thin strip of metal tough enough to withstand intense vibration, yet ductile enough to bend double without fracture. Brittleness is avoided by quenching in cool water or by continuous rolling while the metal cools.

The wide use of dielectric and induction heating in industrial processing demands electronic tubes more rugged both electrically and mechanically than those used for communications, and such a tube has been developed. It has a heavy wall anode, silver-brazed connections, a correct form of glass envelope, heavily plated seals and correct grid support and design, while tantalum is employed in all high-temperature portions of the grid assembly. Rectifier equipment potentially applicable to industrial processes other than electroplating incorporates automatic stabilization of voltage or amperes.

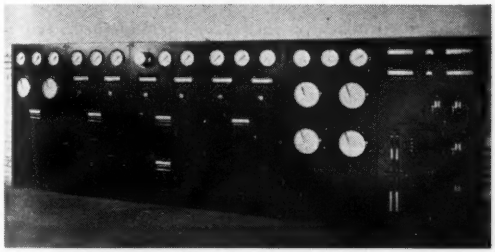
Locomotive Testing

INAUGURATION OF "LABORATORY" INSTALLATION AT RUGBY

Control desk for hydraulic dynamometers

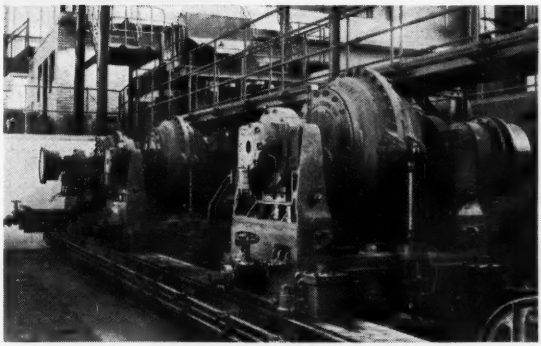
THE orthodox way of testing railway locomotives has been by the haulage of test trains at varying speeds on ordinary track, results being recorded in a dynamometer car coupled between the engine and its train. Railroad performance at more "constant" speed has been determined with the aid of mobile testing units (automatically controlled electric braking) while thermal comparisons are claimed to be made more accurately by observation of a stationary locomotive, in what is virtually a laboratory, with its driving wheels running on rollers having rims of similar profile to that of the normal track rail, as was done by the former G.W.R. at the Swindon works.

A new test house of this kind at the former L.M.S. locomotive repair site at Rugby was officially opened last week by the Minister of Transport, Mr. A. Barnes, who was introduced by Sir Eustace Missenden, chairman of the Railway Executive, Mr. D. R. Carling being the superintending engineer of the testing station.



Above: **The indicating and recording instrument panels**

Right: **Part view of hydraulic brake and torque dynamometers**



The project was proposed by the late Sir Nigel Gresley, then chief mechanical engineer of the L.N.E. Railway, in his 1927 presidential address to the Institution of Mechanical Engineers. It was reported upon favourably by two different committees before the former L.M.S. and L.N.E. Railways decided in 1936 to proceed jointly with the construction, subsequently suspended during the war and revived in 1944.

The testing plant consists of seven pairs of rollers, each designed to carry an axle load of 30 tons, which support the locomotive. The coupled wheels of the latter drive up to five pairs of rollers which are, in turn, coupled to dynamometers (hydraulic brakes) capable of absorbing up to 1,200 h.p. and designed for a maximum speed equivalent to 130 m.p.h. The power absorbed depends on the permissible rise in temperature of water circulating through the brakes, which is re-circulated through a cooler. The whole installation, by Heenan & Froude, Ltd., is rated at 4,500 h.p. and capable of being increased to 6,000 h.p.

Apart from braking, the dynamometer arms transmit torque to springs, the deflections of the latter are transmitted electrically to the control room for indication as tractive effort at each axle. Each dynamometer can be controlled separately

or all can be operated together from the control desk, fitted with push-switches, pilot lamps and indicating instruments, including five Record electrical tachometers.

The power of the locomotive is measured at the drawbar by a dynamometer made by Alfred J. Amsler & Co., Switzerland, with an integrating ink-grapher recording table driven from the locomotive wheels by "Selsyn" electric transmission.

There is also a "Farnboro" electric indicator by Dobbie, McInnes, Ltd., while various temperatures, pressures, vacua, etc., are indicated and recorded on Cambridge instrument panels extending across the control room back-wall.

The wheel rollers and dynamometer brakes can be traversed along sole-plates founded on steel grillage by a motor driven pinion engaging with racks for each unit, which can be re-set within 0·01 in. centering error. Similarly the drawbar gear can be raised and lowered by a motor, as can the whole of the Amsler dynamometer, which is fitted with special mediating gear for automatically recording and adjusting errors.

There is a travelling overhead crane by Henry Lees & Co., Ltd., and an electric coal hoist while motor starters and distribution fusegear of a variety of makes have been used. The wiring and lighting installations were carried out by Rashleigh Phipps & Co., Ltd., and a fair proportion of copper conduit has been employed.

Transmission Topics

CHAIRMAN'S ADDRESS TO I.E.E. SUPPLY SECTION

IN his address as chairman of the Supply, formerly Transmission, Section of the Institution of Electrical Engineers last week Mr. C. O. Boyse (B.I. Callender's Cables, Ltd.), pointed out that capital expenditure on electricity supply in the United Kingdom exceeded £800 million. Of that total roughly one-quarter had been on generation, one-half on transmission and distribution and the remaining quarter on such other transmission items as transforming and switching stations. The rate of expenditure reached the maximum of about £40 million per year in 1938, falling to £12 million per annum at the end of the war period.

The high pitch of transformer development was indicated by the fact that some 132-kV units were working at efficiencies approaching 99 per cent. Resistance switching was an important advance; it had been applied to both oil-tank and air-blast circuit breakers. Protective gear correctly cleared 95 per cent of the 925 faults that occurred in 1947 on the grid system. The length of 132-kV lines had increased to 4,000 miles and plans were now being made for the first stage of superimposing a system of 264-kV lines on the existing 132-kV grid.

Overhead Line Design

Revised overhead line regulations had been drafted and would be discussed in due course; meanwhile Mr. Boyse urged international collaboration to agree upon some common basis for expressing design loads on, and stresses in, conductors and supports. Precisely similar results could be arrived at along widely different avenues of approach, thus making it clear that neither the magnitude of the design loads nor the values of the "maximum working stresses" could separately be used as a measure of security in service. The two factors must be considered together; this was the only basis on which practices in different countries could be compared.

The most logical thing to do was to design for ultimate loads and near ultimate stresses. Mr. Boyse strongly endorsed the British policy of stipulating only the general principles to be observed, leaving the designer free choice of the means he could employ to achieve the results desired.

Following comments on conductor vibration in relation to the U.S. National Safety Code and an important series of tests being conducted in the United States to determine whether conductor galloping could be prevented, it was stated that hollow conductors consisting of interlocking drawn segments had proved to be reliable at 287 kV in the United States while much work was still being done on "bundle" conductors.

There would be further progress with semi-conducting ceramic glazes for porcelain insulators and more would be heard of toughened glass insulators in the near future, but there had not been much change in design of supports and construction of foundations for overhead lines.

Such developments as the very light steel towers used in Italy and concrete-filled tubular structures in Switzerland might be well conceived in relation to local circumstances, but total annual costs rather than first cost alone had to be considered. It was doubtful whether enough was known about foundations to indicate more precisely what degree of stability should be specified.

Finally the address referred briefly to various kinds of gas-pressure cables for high voltages; to sheathing with aluminium and (up to 11 kV) with thermoplastic polythene; and to the pipe line (filled with oil or gas under pressure) type of cable which is widely used in the United States.

PERSONAL and SOCIAL

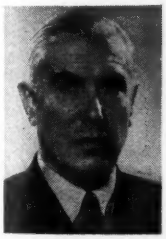
News of Men and Women of the Industry

THE Lord President of the Council has appointed **Messrs. J. Bowman, E. Fletcher** and **H. W. H. Warren,** D.SC., M.I.E.E., M.I.MECH.E., to be members of the Advisory Council for Scientific Research from 1st October. Mr. Bowman is vice-president of the National Union of Mineworkers and a member of the T.U.C. Scientific Advisory Committee; Mr. E. Fletcher is secretary of the Research and Economic Department of the T.U.C.; and Dr. H. W. H. Warren is managing director of Associated Electrical Industries, Ltd. The new members succeed Mr. J. Benstead, C.B.E., Mr. E. Thornton and the late Sir Clifford Paterson.

The Minister of Fuel and Power has appointed **Mr. A. H. A. Wynn,** M.A.(CANTAB), to be director of the Safety in Mines Research and Testing Stations at Sheffield and Buxton in succession to **Dr. H. F. Coward,** D.SC., F.R.I.C., who is about to retire from the public service. Mr. Wynn has undertaken research work in agriculture in Germany and Roumania and held a research scholarship at Christ Church, Oxford. He was called to the Bar in 1939, and from that year until taking up his present appointment was research engineer with A. C. Cossor, Ltd.

Mr. William Fraser, M.I.E.E., chairman of Scottish Cables, Ltd., is leaving for Capetown on 4th November for a visit to South Africa and Southern Rhodesia where his company has secured a large amount of business. He proposes to return from Capetown on 4th February.

Mr. D. G. W. Acworth, M.A., M.I.E.E., whose appointment as manager of the Export Department of the General Electric Co., Ltd., we briefly mentioned in our last issue, was educated at Radley and St. John's College, Cambridge and joined the G.E.C. in 1923. He specialized in heating and cooking and was an original member of the Household Appliances Department under Mr. Winstanley in 1926. He visited Australia and New Zealand in 1929 and in company with Mr. H. W. Adams toured the West Indies in 1932. In 1933 he was appointed manager of the Domestic Cooker Department. Mr. Acworth was chairman of the B.E.A.M.A. Cooker Section in 1946-47 and was a founder member of the I.E.E. Installations Section Committee; he also served on several B.S.I. Committees connected with heating and cooking. He transferred to Export Department of the G.E.C. early this year.



Mr. D. G. W. Acworth

Mr. H. A. Price-Hughes, A.M.I.E.E., manager of the Publicity Department of the British Thomson-Houston Co., Ltd., retires at the end of this month, after forty-four years' service with the company. He is succeeded as manager by his deputy, **Mr. C. H. Chaplain.**

Mr. Price-Hughes was educated at St. Paul's School, and obtained his electrical engineering

Mr. H. A. Price-Hughes

Mr. C. H. Chaplain

training at Faraday House. After practical experience with Belliss & Morcom, Ltd., and Cardiff Corporation Tramways, he joined the B.T.H. Power and Mining Department in 1904. In the following year he was transferred to help Mr. B. F. McMurtrie, who had just started the Export Department. Mr. Price-Hughes left that department in 1911 to organize the preparation and distribution of the company's technical literature, and formed a new Publication Department which in 1930 was merged with the Advertising Department and the name changed to Publicity Department. Under his managership the total number of B.T.H. technical publications in current use rose from 55 to over 7,000. Although retiring from the managership of the department he will still be available for consultation.

Mr. Chaplain joined the B.T.H. switchgear drawing office staff at Rugby in 1912, after completing an apprenticeship with Siemens Bros. Dynamo Works, Ltd., Stafford, followed by a short period with the Westinghouse Electric & Manufacturing Co., Ltd. In 1913 he joined Mr. Price-Hughes. From 1914 to 1919 he served in 73 Field Company, R.E. On demobilization he returned to the B.T.H. Publicity Department to take charge of the motor and control gear section. He was appointed deputy manager of the Publicity Department last year. Mr. Chaplain was a founder-member of the B.T.H. Operatic Society of which he was, first, accompanist and, later, musical director.

Mr. N. Fleming, A.M.I.E.E., superintendent at the Bedford power station, has retired after twenty-four years' service. Before going to Bedford he was with Metropolitan-Vickers Electrical Co., Ltd., first in this country and subsequently for five years in India. He held posts with other electrical concerns in India before returning to England. At a gathering of about 150 officials and friends at the offices of the B.E.A. in Prebend Street, Bedford, on 15th October, he was presented with a nest of tables, an electric radiator and a fountain pen by Mr. P. G. Campling, manager of the Chiltern Sub-Area, on behalf of the staff.

A new arrangement has been made by Oldham & Son, Ltd., Denton, Manchester, which places the Export Department under the joint control of two senior executives. This step has been taken to facilitate the handling of their rapidly-expanding overseas business. The Export Department will now be in the hands of **Mr. A. H. Bull** as export manager, and **Mr. Humphrey C. Edmonds** in the newly created post of manager, Overseas Sales Development. Mr. Edmonds, who is a newcomer to Oldhams, will be at the London offices at Derbyshire House, W.C.1. He was with the Standard Motor Co. for seventeen years, latterly as sales promotion manager. Mr. Bull, who was previously the company's export technical adviser, is operating from the head offices at Denton. **Mr. A. G. Townsend,** who until recently was in charge of the Export Department, is joining the board of a new Oldham company now being formed in collaboration with S.A. d'Eclairage et d'Applications Electriques of Arras, to provide full manufacturing and service facilities for Oldham lamps and batteries in France. New Oldham companies are shortly to be established in India and South Africa.

Mr. H. C. Edmonds

Mr. R. J. Pettitt, sales director of B.E.N. Patents, Ltd., has returned to duty after a long absence due to illness.

Mr. J. Tremble, of Gosforth, chief mining electrical engineer in the No. 7 Area (South Northumberland) of the Northern Divisional Coal Board, has been elected president of the North of England branch of the Association of Mining Electrical and Mechanical Engineers.

Mr. W. Benink, general manager of the Export Department of Mullard Electronic Products, Ltd., accompanied by **Mr. R. W. Addie,** M.A.(ENG.)(CANTAB.), as technical adviser, left London airport on 16th October for a six weeks' tour of the Middle and Far East, in connection with the development of the company's export trade.

Mr. Harold Hobson, formerly chairman of the Central Electricity Board, will leave by air for India on 10th November in his capacity of consulting engineer to the Calcutta Electricity Supply Corporation and on other business. He expects to return to England before Christmas. In the meantime communications addressed as hitherto to 19, Montague Square, London, W.1, will be dealt with in his absence.

Mr. F. C. Jarvis is resigning his position as contracts manager to Hi-Craft Electrical Products, Ltd., and Duralite, Ltd., and has been appointed to the board of the Queensbury Engineering Co., Ltd., Stanmore, Middlesex, from 1st January next.

The annual dinner of the North Eastern Centre of the **Institution of Electrical Engineers** will be held at the Royal Station Hotel, Newcastle-on-Tyne, on 25th November. Tickets (£1 1s. each) can be obtained from the assistant secretary of the Centre, c/o A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.

The Tees-Side Sub-Centre of the Institution is reviving its annual dinner-dance, which will be held on 26th November at the Corporation Hotel, Middlesbrough. Applications for tickets (16s. each) should be made to Mr. G. H. Davidson, hon. secretary, 65, Barker Road, Linthorpe, Middlesbrough, and cheques or postal orders should be made payable to Mr. R. L. Hewling and crossed.

The Long Service Association of the **Micanite & Insulators Co., Ltd.,** held its annual dinner on 16th October, 125 members and guests being present, including Major S. M. Mohr, O.B.E., M.C., M.I.E.E., managing director, and his wife and daughter. Presentations were made to members who had completed twenty-five years' service with the company. The Association now has 111 members, 107 of them still being employed with the company. Of this total 78 have completed twenty-five years' or more service and nine members have now completed over forty years' service.

The Telcon Staff Association (**Telegraph Construction & Maintenance Co., Ltd.**), held its first dance of the season on 15th October at the Greenwich Town Hall. About 180 members and friends were present including Mr. J. N. Dean and Mr. W. F. Randall, directors of the company.

The annual dinner of the **Johnson & Phillips Foremen's Association** was held on 15th October at Woolwich. Directors and management of the company were fully represented and many of the senior staff were among the guests. Several retired members of the J. & P. Foremen's Association were present by special invitation. In proposing the toast of the company, Mr. Simmons mentioned the expansion of its activities and increased number of factories abroad as well as at home. Mr. G. Leslie

Wates, chairman of J. & P., in reply, said that factories were now active in Australia and South Africa while one in Pakistan was nearly completed and one would later be opened in India. He referred to the development of aluminium sheathed power cables, which he thought had a great future. Mr. Hayward, secretary of the Association, reported on its present-day activities, and Mr. D. G. Rodger, assistant general manager, replied to the toast of the guests.

Obituary

Mr. F. A. Youngmark, A.M.I.E.E.—The English Electric Co., Ltd., announces the sudden death of Mr. F. A. Youngmark, chief a.c. engineer, whilst in London on 13th October shortly after he had attended a technical conference. Mr. Youngmark joined Dick, Kerr & Co. in 1910 as a draughtsman in the d.c. section. In 1914 he was appointed assistant to the chief designer of a.c. machines. When the Dick, Kerr Co. became one of the constituent firms of the English Electric Co., Mr. Youngmark was transferred in 1920 to the Central Design Department of the latter company situated in London.

The late Mr. F. A. Youngmark

In 1926 he joined the design staff of the Stafford works where he continued as an a.c. designer until 1936 when he succeeded Mr. A. D. Sloan as chief a.c. engineer on the latter's appointment as chief engineer to the company. Mr. Youngmark played a considerable part in the development of large steam and hydro turbo alternators. Mr. Youngmark, who was sixty three, leaves a widow and a son and daughter who are both married.

Mr. Charles A. Hopkins, general manager of Sunderland Corporation Transport Department for nineteen years has died at the age of sixty-two after a six months' illness. Mr. Hopkins was born at Charlton Kings, Gloucestershire, and started his career as a junior in 1905 with the Swindon Corporation Electricity and Tramways Department. In 1910 he joined the Chatham and District Light Railway Co., Ltd., and after nine years became assistant manager of the Wigan Corporation Tramways Department. In 1925 he became manager at Wigan and four years later was appointed manager at Sunderland.

Mr. F. C. Mannox.—The death occurred on 21st October of Mr. F. C. Mannox, managing director of Murex, Ltd. He was forty-nine.

Mr. David B. Scott, who until his retirement was mains superintendent of Motherwell and Wishaw Electricity Department, died last week at the age of seventy-six.

Mr. Robert Steven, who has died at his home in Stornoway at the age of seventy-six, was a director of the Stornoway Electric Supply Co.

WILLS.—Mr. N. A. Enticknap, joint secretary of the General Electric Co., Ltd., who died on 9th May, left £18,052 gross (£17,834 net).

Mr. T. C. D. Poynter, late director of the Charing Cross Electric Lighting Co., who died on 28th February, left £6,361 gross (£6,242 net).

Mr. A. Lisle, M.I.E.E., for many years on the staff of the British Thomson-Houston Co., Ltd., who died on 7th August, left £5,527 gross (£5,443 net).

Mr. M. D. Bradford, chairman of the Cambridge Electric Supply Co., who died on 26th July, left £77,198 gross (£74,651 net).

Mr. H. A. Beal, electrical engineer, South Harrow, who died on 30th April last, left £12,396 gross (£12,285 net).

Electricity Supply Training

THE British Electricity Authority and the Electricity Boards have prepared a scheme for training technical engineering staffs. Candidates should have either an engineering degree of a British university, a Higher National Diploma in Engineering or its equivalent, a Higher National Certificate in Engineering, or have passed the associate membership examination of the Institutions of Electrical or Mechanical Engineers.

There is a choice of three courses, each normally of two years, viz., power station operation and maintenance; transmission system construction, operation and maintenance; and distribution. Each course includes six months in a manufacturer's works and a short period devoted to the subjects of the other two courses. Changes from one course to another during the first twelve months may be considered. For selected trainees a three-year course covering the whole industry will be organized.

Trainees will be paid £285 and £300 in the first and second years, with an addition of £25 in the London area, and travel and subsistence allowances if moved from one area to another. Where practicable, trainees will be posted to areas they prefer. Shortened courses will be considered for ex-Service men with practical experience or who are taking intensive courses for National Certificates and are required to obtained six months' practical experience between their Ordinary and Higher National Certificate courses.

Application forms can be obtained from the Education and Training Department, British Electricity House, Great Portland Street, London, W.1. Forms for the course on distribution can also be obtained from secretaries of the Area Boards.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Interference with Television

HOW much longer are the manufacturers of television receivers going to tolerate the unrestricted production by other manufacturers of electrical apparatus which renders television reception almost impossible?

As an individual the television viewer can do nothing to grapple with this problem of interference with his reception, and must therefore look to the makers of his set for some protection.

With the extension of the television service this interference problem will grow alarmingly, and it is high time that manufacturers and retailers combined to ensure that purchasers of television sets will not be the victims of the multitude of electrical gadgets which their unwitting neighbours are installing.

*London, W.C.*1. W. R. CRAWLEY.

Impregnating Plant

REFERRING to the statement by "L. E. S." in his letter in your 15th October issue that he "would agree that there were *special* types of component where vacuum impregnation *might* be necessary" (the italics are mine), I can pardon his uncertainty on this point because of the complexity of the subject, but I consider that the implication of "L.E.S." that such doubts are confined to special types of component should be corrected.

A high proportion of wound components which cannot be impregnated properly without vacuum are manufacturers' standards of common types. Owing to the failure to admit respective scopes for the two methods the statements of "L. E. S." in favour of non-vacuum modes have been as exaggerated as those in support of vacuum impregnation in the article which was published in your 30th July issue.

Providing a varnish is free from pigmentation and certain other features which reputable varnish makers do not include in an impregnating varnish, then the property of penetration (on which "L. E. S." lays such emphasis) is really largely a matter of viscosity rather than whether the base is bituminous or resinous or the "volatile" a product of petroleum or coal tar.

The viscosity of varnish can be lowered (and thus its penetrativeness increased) in two ways. The varnish can be thinned by increasing the volatile content; but this reduces the benefits of impregnation. Hence the reference in my earlier letter to "a varnish possessing excellent penetrating properties consistent with reasonably high solid content."

The temperature can be elevated, as obtains when varnish comes into contact with a component which is dipped hot, but if the temperature is carried high, the depth of penetration will be decreased in certain cases, for well-known reasons. I have observed this phenomenon most with thermo-setting varnishes, to which class the solvent-less varnishes belong.

P. H.

Charges in Sheffield

IN the *Electrical Review* of 22nd October (page 620—"Views on the News") "Reflector" quotes a letter in the *Sheffield Telegraph* in which the writer complained about having to pay not only a higher kilowatt-hour charge for his electricity, but also a higher rateable value charge "15 per cent instead of 12½ per cent."

For your information the Sheffield charges pre-nationalization were for domestic consumers:—Rateable value charge 8½ per cent (no rateable value charge beyond £75 annually), plus 0·45d. per kWh. Up to 1946 the kWh charge on the rateable value tariff was 0·33d.

Sheffield. JOHN R. STRUTHERS,
Manager,
No. 3 Sub-Area, Yorkshire Electricity Board.

Commencing with this issue, copies of *Electrical Review* going overseas will be printed on heavier paper and, periodically, additional pages will be included in overseas issues. This has been made possible by a modification of Board of Trade regulations in respect of export copies. These changes cannot apply to copies distributed at home

Productivity Council

THIS week and next the Anglo-American Productivity Council is holding its first session. After the first meeting in London on Monday last Sir Frederick Bain, joint chairman of the British section, said that it had been decided that the Council's terms of reference should be "to exchange views on the ways through the European Recovery Programme and otherwise, in which the United States industry could co-operate in assisting British industry to promote greater productivity." Topics to be considered included capital re-equipment, investment, quantity *versus* quality production, production costs, specialization and standardization. It was appreciated that the two countries' differing problems required different approach.

Mr. Lincoln Evans, the other chairman of the British side, representing trade union interests, said there was no bar on the discussion of restrictive practices by workpeople if, in fact, any could be found.

Mr. Philip D. Reed, chairman of the United States section, who is chairman of the American General Electric Co., said that the American side of the Council came with humility, aware that they were not and could not be familiar with conditions and problems here. After war-time experiences in joint consultations between the two countries he found nothing new or unusual in the conference. Both countries could learn from each other and he and his colleagues would be glad if they could make a small contribution to the productivity of Great Britain. The work of the Council was not one of miracles—production never was. It was a case of a great many approaches, carefully and methodically carried out.

M.V. "Fulham X"

TO commemorate the maiden voyage of the motor collier *Fulham X* (the electrical equipment of which was referred to in our last issue) a dinner was held at Fulham power station on Monday last. In the afternoon a number of distinguished visitors, who included Lord Citrine, Sir Henry Self, Mr. W. C. Parker and Mr. J. N. Waite, boarded the vessel down river and then proceeded to Fulham, the opportunity being taken during the "voyage" to inspect the ship's electrical equipment and the general accommodation.

Mr. Waite presided at the dinner and Lord Citrine in proposing the toast of "The *Fulham X* and the Collier Service of the B.E.A.", referred to his association with the shipping industry when as an official of the Electrical Trades Union part of his job had been to organize the seagoing electricians. The conditions on board ship in those days were far from being so good as those he had just seen in the *Fulham X*. There had been some talk of the control of the collier fleet being placed in other hands, but it was the policy of the B.E.A. to hold all the ships that had come under its control.

Mr. Parker, in responding, paid a tribute to Lord Citrine who, if anyone, he said, would lead the nationalized industry to success. Mr. Waite proposed the health of the guests and other speakers were the captain of the ship, the Mayor of Fulham and Mr. J. W. Perotti, chairman of the Fulham Electricity Committee.

Faraday House Dinner

ABOUT 200 attended the annual dinner of the Faraday House Old Students' Association on 22nd October, at which Dr. W. G. Radley (G.P.O.), president, took the chair. The toast of "Faraday House" was proposed by Mr. T. G. N. Haldane, President I.E.E., who referred to the old motto of the College, "Theory and Practice," as furnishing the foundations of successful engineering. Engineering training in universities still left much to be desired. A broader outlook was necessary to the survival of civilization and in inculcating this Faraday House had been prominent.

Responding, Dr. W. R. C. Coode-Adams (principal, Faraday House) said that the equipment at the College was being renewed but deliveries were slow. Accommodation was booked up for several years and the number of students enrolled surpassed that of 1931—previously the highest in the College's history.

The health of the guests was proposed by Mr. C. H. Sparks (Babcock & Wilcox); Sir John Dalton (C.M.A.) and Sir Vincent de Ferranti replied.

In proposing the health of the chairman, Brig. F. T. Chapman referred to his own nine years as senior lecturer at Faraday House and said that experience showed that success depended on personal qualities. Dr. Radley, in reply, equating sound engineering with common sense, emphasized the value of at least two years' training in a works where the essential knowledge of machine tools and of the men who worked them could be gained.

Large G.E.C. Extensions

OVER a million pounds is to be spent by the General Electric Co., Ltd., on extensions to its electrical engineering works at Birmingham and to its mechanical department at Erith, Kent, to meet the urgent demand for power station generating plant.

These extensions, which will include a new turbo-alternator works capable of manufacturing generators of 130,000 h.p., nearly twice the size of the largest standard unit at present being made in this country, will enable the company almost to double its output of generators. Work on the new extensions is to start immediately, and it is expected that they will be in production within eighteen months to two years.

British Electricity Contracts

DURING the past month contracts have been placed by the British Electricity Authority for generating station, switching and transforming station and transmission equipment amounting in the aggregate to £2,283,108. The principal contracts include the supply and laying of 3·3-kV and lower-voltage cables, Agecroft generating station (Aberdare Cables, Ltd.); structural steelwork for main and ancillary buildings, Clarence Dock (Liverpool) station (Francis Morton & Co.); foundations, Huncoat (Accrington) generating station (J. Jarvis & Son, Ltd.); superstructure, Croydon "B" station (Sir R. McAlpine & Sons, Ltd.); steelwork, Bankside station (Sir Wm. Arrol & Co., Ltd.); coal-handling plant, Braehead (Glasgow) station (Mavor & Coulson, Ltd.); coal-handling plant, Skelton Grange (Leeds) station (International Combustion, Ltd.); 132-kV, 2,500-MVA switchgear, Brighton substation (English Electric Co., Ltd.); and 132-kV cables and pilot cables, Braehead (Pirelli-General Cable Works, Ltd.).

Electrical Manufacture in India

THE present position of home production of electric motors, automatic telephone equipment and batteries in India is dealt with in the *Indian Trade Bulletin* For all practical purposes, the journal states, the electric motor industry is a wartime development. The industry, which hardly existed in 1939, has now been firmly established and is being expanded to meet all the requirements of the country for the particular type of motors needed. So far the Indian industry has confined itself to the production of a.c. squirrel-cage 3-phase motors of from 1 to 30 h.p. D.c. motors, special motors, fractional-h.p. motors and units above 30 h.p. are not being made in India, although a few producers contemplate manufacturing some of these varieties when the raw materials position improves. The Tariff Board estimates the total annual requirements of electric motors during the next three years at 500,000 h.p., or 100,000 motors, taking a 5-h.p. motor as the average representative type. Of these, 210,000 h.p. (42,000 motors) should be of the range produced in India.

The Government of India has been considering for some time the establishment of a factory in India for the manufacture of all automatic telephone and carrier equipment and in May an agreement was reached with the Automatic Telephone & Electric Co., Ltd., England, whereby for fifteen years in the first instance the company will allow the Government full use of all its patents and other technical information and the company will also assist the Government in the early establishment of a fully equipped telephone factory in India both by acting as consulting engineers and by lending technical personnel when required till nationals of India are trained for the purpose, the company also undertaking to train Indian nationals in its own works in England. Until the factory in India is established the company will appoint the Government of India as its sole agent in respect of all products needed.

The capacity of the Indian battery industry expanded from 18 million cells per year before the war to 132 million cells per year in 1946 and it is expected to rise to 185 million cells by the end of 1948. Manufacturers have under consideration plans for expansion and installation of additional machinery.

Pakistan Engineering Authority

THE Government of Pakistan announces that it has set up in the Ministry of Education and Industries, a Central Engineering Authority, under the chairmanship of Mr. Mohsin Ali. The organization incorporates the former offices of the Electrical Commissioner, the Central Technical Power Board and the Central Waterways, Irrigation and Navigation Commission. The Authority has four branches, each under a director. Its chief functions will be to co-ordinate the engineering activities of the Provinces and States, and to assist them in the preparation of water control, electric power, drainage, irrigation and navigation schemes.

The Authority will also co-ordinate the development of electric power, and assist the Provinces and States in the investigation, survey, preparation and execution of thermal power schemes and hydro-electric projects. It will aim at the adoption, as far as possible, of a uniform policy in respect of procurement of plant, generation, transmission and distribution of electricity. It will collect and publish statistics on national power resources, and act as a clearing house for information on all matters relating to power availability.

The Authority will make recommendations regarding the grant of import and export licences for electrical plant, and advise the Iron and Steel Controller, the Petroleum Officer, and the Coal Commissioner regarding allocation of steel, oil, coal and other fuel to the various thermal power stations. The Authority will assist the Government in promoting legislation especially in respect of grants of concessions under the Electricity Act.

University College Calendar.—A wealth of relevant information is contained in the calendar of University College, London, for the session 1948-49 which is now obtainable from the Secretary, price 7s. 6d. (or 8s. 6d. post free); to students of the College, 5s. (or 6s. post free).

BRITISH ELECTRICAL EXPORTS

Willing and Able

MANUFACTURERS AND THEIR CUSTOMERS

A HUNDRED years ago Great Britain assumed the role of the "world's workshop" and thus began the development of an economy which led to neglect of food production. It was believed that the country's proper function was to produce manufactured goods for other nations who, in return, would supply food and raw materials.

Subsequent events have forced Great Britain to modify this policy, but it has been impossible to revert to a state of self-sufficiency, first, because a population trained in industry cannot easily be turned over to agriculture and, secondly, because such a reversion would seriously upset the economies of the Empire and foreign countries who rely on Great Britain as a customer for their primary products.

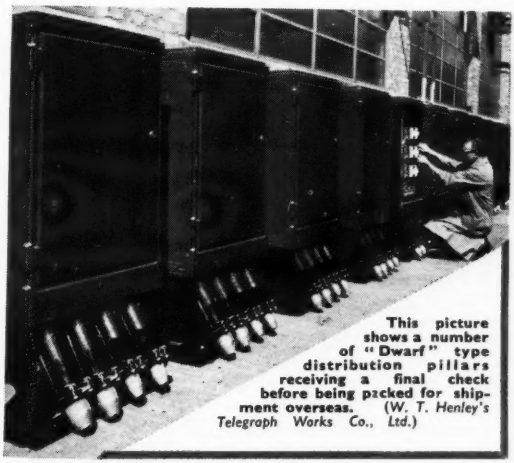
Some redress of this country's balance of industrial over agricultural production has been enforced by the increasing entry of our customers into the manufacture of secondary products, largely on account of the difficulties occasioned by the two world wars. This country's concentration upon the production of implements of war made it impossible for British manufacturers to satisfy overseas demands for badly-needed goods and our customers naturally tried to meet their needs from their internal resources.

How far these tendencies will go is largely dependent upon Great Britain's ability to produce goods of a high standard and of the types which overseas buyers want, at a reasonable price. On the other hand, the position will also be influenced to a great extent by our customers' policy. If they understand that to buy their primary products we must sell our manufactured goods they will endeavour to fit their economies in with ours. As our industrial exports increase we shall be better placed to buy more and more of our customers' products.

British manufacturers have rapidly overcome most of the difficulties with which they were faced immediately after the war, and they are now in a position to meet most of their customers' needs in a much shorter time.

The British electrical industry is playing a leading part in rebuilding and expanding Great Britain's export trade, and in pursuing this object is most anxious to ensure that it is meeting the various needs of overseas purchasers in design, performance and price. Proof that British electrical manufacturers are catering for a wide variety of requirements is contained in the following pages.

While it is true that Great Britain must export to live, this is by no means a charitable appeal. British electrical manufacturers claim to be able to give the best value for money in stability and service and only ask to be judged by their works.



This picture shows a number of "Dwarf" type distribution pillars receiving a final check before being packed for shipment overseas. *(W. T. Henley's Telegraph Works Co., Ltd.)*

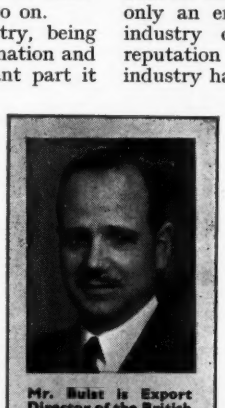
Electrical Export Trade

GREAT BRITAIN'S ABILITY TO MEET ALL NEEDS

BY D. MAXWELL BUIST
M.I.E.E., M.I.EX.

TO any member of the electrical industry it must seem that sometimes there is no end to the demands made upon it by the twentieth century. Does the housewife need a clean home with less toil or the worker quicker and more adaptable tools ?—the electrical industry will meet both requirements. Do industrial conditions require better lighting and improved devices ? Is increased production necessary or a more efficient transport system wanted ?—the electrical industry is found to be indispensable. And so one could go on.

The British electrical industry, being as it is part of a great trading nation and fully conscious of the important part it plays in its country's economy, has developed through the years most valuable connections with countries all over the world. There are few, indeed, if any, parts of the globe where British electrical equipment of some kind or other has not been installed. The outbreak of war hindered these contacts in some cases, but its cessation saw an overwhelming rush by overseas buyers for the various products of the industry.



Mr. Buist is Export Director of the British Electrical & Allied Manufacturers' Association

In spite of the most pressing need at home for generating plant and its associated equipments and for all kinds of electrical goods, a great effort was made by the industry to meet the needs of its overseas customers and to foster their desire for the high workmanship and quality of British electrical products. The capacity of the industry has therefore been and still is fully extended and while all possible steps are being taken to improve its utilization still further, these are bound up with the present difficulties of the whole British economy.

A particular feature of the post-war world has been the desire of primary producing countries to encourage the growth of industry within their borders, to stimulate a diversity of processed agricultural products or to improve the efficiency of factories set up during the war. This desire has usually led to inquiries for electrical plant, quite often hydro-electric plant, mostly of a comprehensive character embracing everything from the intake to the outgoing feeder switchgear. Such schemes cover a very wide range of electrical equipment that calls for much skill and experience which only an enterprising and well-equipped industry can provide, and the high reputation of the British electrical industry has been fully maintained in its execution of tasks of this nature.

It may be noted, too, that not only primary producing countries but also the more advanced industrial nations have been most anxious to repair and improve their capital equipment. The wearing down of manufacturing capacity during the war years due to the lack of suitable renewals created demands for all sorts of electrical gear.

Some of the countries felt that they were not too well acquainted with the modern industrial techniques learnt in this country during the war years and were eager to take advantage of British experience. Their various needs were reflected in their orders. The drive for increased coal production brought inquiries for winders, haulages and conveyor drives. The marked higher consumption of electricity led to a large demand for power station equipment, while the necessity for higher production brought about the application of electrical gear to purposes for which it had not hitherto been considered appropriate and caused the installation of complete electrical equipments for a large number

Electrical Export Trade—*continued*

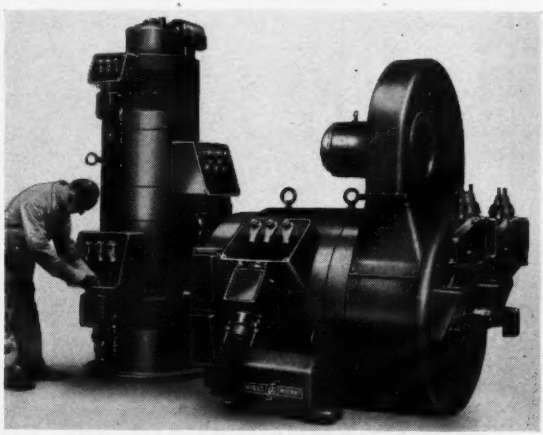
of processes. The contribution made by the British electrical industry to such countries has been very important and is likely to continue to be so; it has helped them to adapt themselves more quickly and easily to the new conditions.

This wider application of electricity has, of course, resulted in a great diversity of electrical products and the British electrical industry maintains large research departments to improve the reliability and quality of its output as well as to anticipate the needs of its customers. Among many others, the gas turbine should be mentioned and the improvements in flameproof equipment for use in coal mines and petroleum installations, short-circuit switchgear testing, new instruments, and new and improved domestic appliances, while the new ranges of fractional-horse-power motors provide evidences of the ability of the industry to adapt itself to meet new requirements. The wartime development of radar too has helped industrial development of electronic and electrical apparatus.

The industry is not only conscious of its high reputation for the quality and reliability of its products and the need to be in the forefront of new knowledge, but seeks to maintain and improve the quality and reliability of its service to its customers. Having regard to the supply of raw materials and availability of labour, as well as other difficulties outside its control, the electrical industry constantly endeavours to satisfy its clients, to provide relevant necessary information and to acquaint them promptly of any difficulties. By overseas visits of leading representatives and where necessary the setting up of permanent organizations, channels can be cut, through which customers' needs can best be dealt with.

The British Electrical and Allied Manufacturers' Association has established a special department to deal specifically with problems of this kind. This Export Department receives many inquiries from abroad, and by keeping in close touch with the industry has gained worth-while experience which is now, and will be in the future, of great value. Prospective customers are also encouraged to visit the principal works and the B.E.A.M.A. is able to facilitate their journeys so that their time can be best employed.

Despite many difficulties, the past months have been months of steady progress and, given stable conditions, it does not seem inappropriate to say that the future seems likely to witness some of the most active years of the electrical industry. Against this prospect of heavy future demand, however, must be set the fact of steadily increasing costs of all raw materials and the lack of evidence of this rise being arrested. The British electrical industry is therefore doing all it can to further the efficiency of its production and to sell the best equipment at the least possible cost. It is confident that it will satisfy its customers in that respect and will successfully maintain its position as a leading exporting industry in world markets.



Variable-speed A.C. commutator motor recently shipped to the Continent for driving a rubber calender. It develops 200/28·6 h.p. with a speed range of 1,050/150 r.p.m. Speed control is by means of a pilot-motor-operated regulator push-button operated. (*Higgs Motors, Ltd.*)

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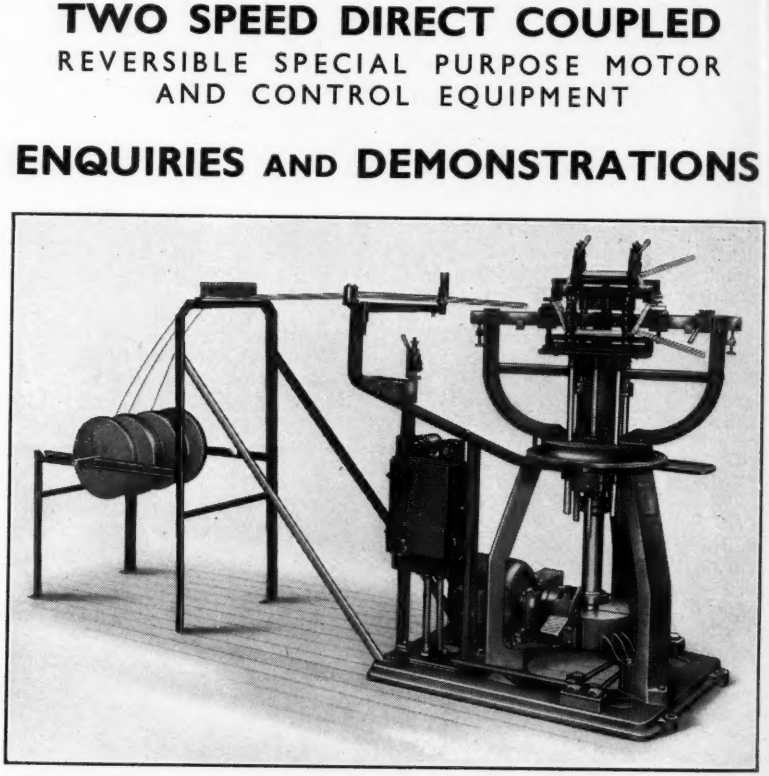

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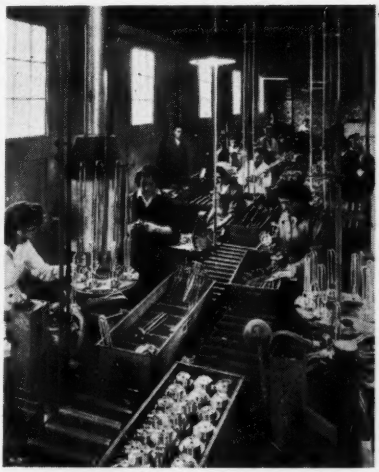
Domestic Appliances

MAINTAINING A HIGH STANDARD OF MANUFACTURE

OUTSIDE Great Britain, the British Thomson-Houston Co., Ltd., is probably at present best known for its heavy electrical plant. The company has, however, equal claims to fame for its production of a wide range of domestic electrical appliances, which include cabinet washing and wringing machines, rotary and table ironers, portable clothes dryers, hand irons, immersion heaters, radiant boiling plates, vacuum cleaners, domestic refrigerators, commercial refrigerating units, toasters, fires, kettles and coffee percolators.

With over half a century of electrical engineering experience behind the company, it is not surprising that in the design of its domestic appliances, emphasis should be placed on securing sound, robust products that will give long service with the minimum of maintenance. This fact has rendered the appliances particularly suitable for service overseas, where conditions may be more onerous than in this country, and where facilities for maintenance may not be so good.

When we recently visited the company's factory at Peterborough we found that electric washing and wringing machines were being manufactured in large quantities for overseas markets. These machines are of the cabinet type, in modern style, developed by progressive improvements from the design produced in 1932, when it was the only domestic electric washing machine being made in this country.



Immersion heater assembly

The machines which we saw incorporate cupboard space in the base for convenient storage of the wringer, soap, etc. Various refinements are available, such as a motor-driven centrifugal pump for emptying the bowl, and a detachable white vitreous-enamelled table top, which covers the machine when it is not in use, thus making a convenient extra work-surface for the housewife.

The washing container is a one-piece aluminium pressing, octagonal in form, and specially shaped in section to take the maximum advantage of water currents generated by the aluminium gyrator. This ensures rapid and effective washing of the full capacity of 7 lb. dry weight of clothes. Machines are finished in a pastel shade cream synthetic-cellulose enamel, which has been chosen for its alkali-resisting properties.

The washing machine mechanism is of modern design, being of unit construction with its motor and gear box rubber-mounted in the cabinet. Pressure die-castings are extensively employed to give accurate components which ensure trouble-free service, at the same time assisting quantity production by the elimination of many machining operations.

The mechanical design of the gearbox is simple : a flexibly-coupled, hardened and ground worm reduces the motor speed direct to 52 r.p.m. and provides slow-speed drive for the wringer and the gyrator. The drive to the gyrator is of patented construction,

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VYBAK extrusion compounds not only provide a rapid rate of extrusion, but their chemical composition results also in excellent electrical properties and tensile strength in wire and cable coverings produced from them. Silk or cotton reinforcement is unnecessary and tinning of the conductor is eliminated, because VYBAK extrusion compounds do not attack copper.

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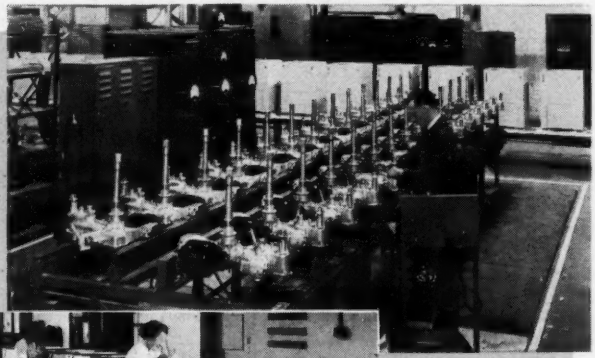
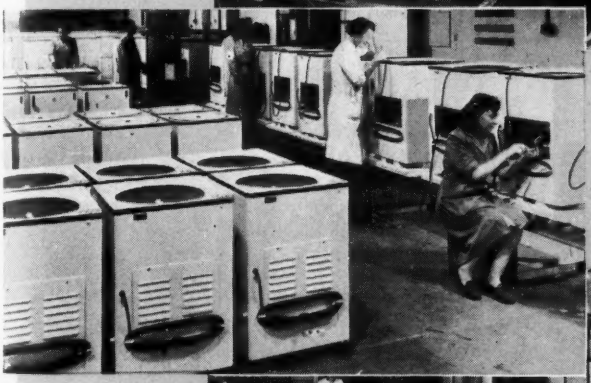
and has a rack spring-loaded to its mating pinion, thus ensuring long life and quiet operation with self-aligning and self-compensating features. The rack and pinion oscillate the pressure die-cast aluminium gyrator through an angle of 210 deg. The ¼-h.p. electric motor also is resiliently mounted, and is permanently aligned with the speed reduction worm. Almost the whole of the wringer is of non-ferrous material, pressure die-cast to shape: the gearbox and covers are of zinc alloy, whilst the main body, bearing housings, drain tray, etc., are aluminium.

A comparatively recent introduction is a rotary ironer attachment which can be used as an accessory to the washing machine, being placed in position instead of the wringer. It incorporates a 1,200-W element and has a 26-in. long roll with an ironing surface equal to that of ten hand-



(Right) — Electric washing machine mechanism on test before final assembly in cabinet



(Left) — Final assembly of electric washing machines

Assembly of radiant tubular sheathed element boiling plates as used in upwards of eighteen different types of British-made cookers

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Domestic Appliances—*continued*

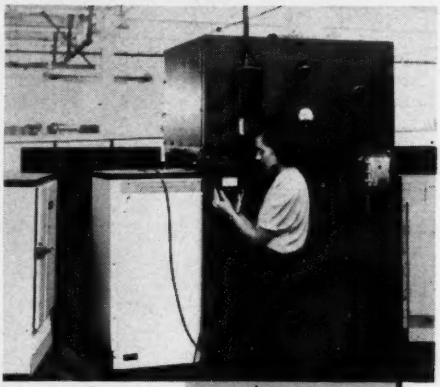
irons. The working face is stainless steel. Also being produced now is an electric table ironer with an effective ironing surface of **266** sq. in. For convenience in ironing materials requiring different temperatures the heating elements (total loading 1,350-W) are divided into two sections—each separately controlled by a thermostat adjustable over a wide range. Despite its comparatively large working surface the table ironer weighs only **36** lb. due to the extensive use of aluminium in its construction.

At the moment particularly large orders are in hand for home laundry equipment for Argentina. Orders have also been received from Australia, South Africa and New Zealand, and a comparatively large number of appliances has been sent to Turkey and Egypt. Iceland is another country to which washing machines have recently been despatched.

Although the company is not at the

(Right)—Table ironer and rotary ironer test

(Below)—Assembly of complete refrigerator system into cabinet



(Above)—Final electrical test on cabinet refrigerator

B.T.H. Coventry Works—Vacuum cleaner motor assembly

moment making electric cookers, it is supplying large quantities of its radiant tubular sheathed element boiling plates, which can be fitted, together with a pressed steel plug-in type cradle of standardized dimension, to upwards of eighteen different types of British-made cookers. The main feature of these elements is that a spiral of nickel-chromium wire is held centrally in an alloy tube by compressed magnesium oxide. There is also a big demand for the sheathed wire element type of immersion heater, which can be fitted either direct into domestic hot water tanks or supplied to other British manufacturers producing self-contained storage water heaters.

Besides manufacturing home laundry equipment, boiling plates and immersion heaters, the Peterborough factory is largely occupied in mass producing "Coldrator" domestic refrigerators for the associated International Refrigerator Co., Ltd.

B.T.H. Coventry Works—Vacuum cleaner nozzle and suction unit assembly

It is worthy of note that hermetically-sealed refrigerators have been built by the company since 1933. B.T.H. is, therefore, not only the pioneer firm in England, but also among the first in the world to manufacture this type of unit, now universally accepted as the foremost design for domestic refrigerators.

As a development of the built-in unit designed for the Ministry of Works, for its temporary housing programme, a 3·2 cu. ft. free-standing model, the "CD.3," is now coming off the production lines in ever-increasing quantities. For the time being it will be reserved almost entirely for export.

As with other products, the refrigerator provides another instance of precision engineering. The heart of the apparatus is, of course, the compressor. Not only does the hermetically-sealed construction adopted for this reduce possible failure to a minimum, but it also greatly facilitates servicing should replacement be necessary. During our visit to the factory we were particularly interested in the honing room where the components of the compressors are given their final finishing and cleaning treatments before assembly in an air-conditioned room. The cleanliness demanded for the working conditions is especially striking, but this is most important since for most of the components finished here a tolerance of only 0·00015 in. is permitted. Elaborate precautions are taken to ensure that the hermetic sealing is perfect. Metal-to-glass vacuum tight seals to carry electric current to the motors are one of the special features adopted. Frequent tests are carried out at all stages of construction and an imposing new fully mechanized dehydration equipment, which has just been installed to give increased capacity, will provide another guarantee of long trouble-free operation. The starting relay controlling the split-phase induction motor incorporates a self-resetting overload safety device. A bellows type thermostatic control switch is fitted.

When we visited the factory orders for 3·2-cu. ft. refrigerators were being dealt with for Sweden, Portugal and Australia. Larger models with a 6-cu. ft. capacity were also being completed for Argentina.

At the company's Coventry works two types of vacuum cleaner, both of the exterior bag variety, are now in production. One is the standard, model 500, machine, while the other is the "Junior" cleaner, the 400. Both are of modern streamlined design with lightweight aluminium bodies. Brushes are incorporated, and a complete set of accessories is also available. Three types of domestic electric irons are manufactured, the "Standard," "De Luxe" and automatic heat-controlled models.

Overseas Electrical Trade

FURTHER EXPORT EXPANSION IN THIRD QUARTER

ALTHOUGH affected by the holidays, British exports of electrical equipment in the third quarter of 1948 maintained the unbroken rise of the past two years, as shown by the following quarterly totals:—1947: £15,700,000, £16,600,000, £20,900,000 and £21,200,000. 1948: £23,100,000, £25,900,000 and £26,200,000. For the purpose of comparison with pre-war results, one-quarter of the total value in 1938 amounted to £5,500,000.

In September (twenty-six working days) the value of electrical exports was £8,610,793, a total lower than in June and July but more than in any other month. As will be seen from Table I, compiled from figures published in the Board of Trade returns for the month, there

Table I.—Electrical Exports and Imports

Class	Exports			Imports		
	Sept., 1948	Sept., 1947	Monthly Av., 1938	Sept., 1948	Sept., 1947	Monthly Av., 1938
	£	£	£	£	£	£
Telegraph and telephone wires and cables (submarine)	19,315	76,361	17,289			
Ditto, not submarine	628,242	343,523	71,803			
Wires and cables, rubber insulated	391,681	603,927	117,533			
Ditto, cotton, silk or artificial silk insulated	76,234	32,195	*	33,735	9,929	31,246
Ditto, enamel, glass or asbestos insulated	27,415	18,219	*			
Ditto, paper insulated	747,871	197,206	103,457			
Ditto, other	83,296	102,957	49,799			
Commercial radio apparatus	132,767	104,388	28,296	44,673	23,326	58,018
Domestic radio apparatus	300,646	425,656	36,755			
Telegraph, telephone and signalling apparatus	964,583	704,582	242,716	7,232	3,642	9,243
Other radio, etc., apparatus	327,619	303,348	57,848	—	—	—
Radio valves	161,610	128,734	41,272	7,150	29,227	10,893
Electric carbons, furnace	*	*	*	35,125	83,795	4,054
Ditto, other	*	*	*	2,357	6,114	2,301
Electric lamps, not exceeding 24 V	22,997	15,092				
Discharge lamps	21,735	21,710	49,440	6,734	4,712	10,265
Other lamps	84,788	68,676				
Other lighting apparatus	398,201	319,747	48,565	6,725	4,609	38,662
Primary batteries	64,052	56,204	13,572	*	*	*
Accumulators for motor vehicles	102,500	137,086	16,418	*	*	*
Ditto, traction	2,769					
Ditto, radio	15,581	55,441	12,456	*	*	*
Other portable accumulators	30,694					
All other accumulators	33,645	18,324	19,773	*	*	*
Parts and accessories	69,837	57,857	—	*	*	*
Cooking apparatus and elements	174,604	88,473	16,600	*	*	*
Heating apparatus and elements	66,011	96,058	14,064	*	*	*
Other parts and accessories	43,908	25,311	—	*	*	*
Commercial electrical instruments	88,421	87,386	15,878			
House service meters	160,388	126,265	15,791	21,654	16,733	32,057
Other electrical instruments	83,542	83,269	9,612			
Electro-medical apparatus (not X-ray)	39,259	17,963	3,038	*	*	*
X-ray apparatus, tubes and parts	66,652	52,092	4,881	15,289	25,527	9,734
Insulating cloth and tape	53,302	32,047	7,038	*	*	*
Other insulating materials	80,551	74 995	12,305	*	*	*
Unclassified goods and apparatus	389,710	348,671	108,085	25,912	26,337	56,529
Generators, up to 200 kW	286,069	138,462	38,071	*	*	*
Ditto, over 200 kW	165,757	522,113	119,079	*	*	*
Ditto, parts	227,599	292,642	—	*	*	*
Motors, railway and tramway	459	1,520	15,977			
Ditto, other, up to ½ h.p.	127,200	36,656	9,001			
Ditto, from ½ to 1 h.p.	59,172	39,160	2,470	25,455	12,696	26,033
Ditto, from 1 to 250 h.p.	410.000	240,275	96,637			
Ditto, over 250 h.p.	15,827	12,752	20,960			
Ditto, parts	67,424	49,231	—			
Converting machinery	3,535	8,630	101,304			
Transformers, including coils	243,469	338,721				
Rectifiers for power house use	20,199	31,884	3,463			
Motor starting and controlling gear	137,912	80,949	50,866	53,185	71,901	14,455
Switchgear and switchboards (not telegraph or telephone)	680,568	376,178	184,533			
Other electrical machinery	39,184	27.672	15,497			
Vacuum cleaners and parts	118,764	269,496	26,662			
Other electrically-operated portable appliances	54.229	27,989	10,394	4,843	4,093	24,627
Total	8,610,793	7,318,093	1,829,198	290,069	322,641	328,117

* Not separately classified.

was an increase of £1,292,700 (17·7 per cent) over the corresponding month of last year. Most classes of exports were below the record July values. In the case of wires and cables, however, it is noted that, contrasted with a sharp decline in supplies of rubber-insulated types sent abroad, those of other kinds exceeded the July figure. So far this year exports of rubber-insulated cables have amounted to £3,876,444 (against £3,583,479 up to September, 1947) while supplies of those with insulation other than rubber have jumped from £3,575,070 to £7,252,813; South Africa, India and Pakistan, and Australia have each taken over a million pounds' worth. These figures do not include

Table II.—Distribution of Exports of Electrical Goods and Apparatus

Destination	Sept., 1948	Sept., 1947	Monthly Av., 1938
	£	£	£
Eire	168,633	158,244	37,726
Channel Islands ..	25,166	40,504	12,177
Malta and Gozo ..	27,378	10,070	5,873
Cyprus	14,182	19,382	1,373
Palestine	6,230	119,979	8,426
British West Africa ..	100,827	45,490	12,889
Union of South Africa	907,395	647,808	162,584
Southern Rhodesia ..	119,418	43,533	9,632
British East Africa ..	101,410	53,817	7,893
India, Pakistan, etc.	492,354	816,723	123,789
British Malaya ..	144,995	165,403	32,792
Ceylon	63,173	56,778	15,048
Hong Kong	128,283	67,031	12,939
Australia	747,936	181,859	197,366
New Zealand ..	350,170	258,514	96,225
Canada	66,175	61,802	12,547
British West Indies ..	90,426	36,116	12,954
Anglo-Egyptian Sudan	25,089	7,105	2,989
Other British Countries	130,622	42,508	11,030
Soviet Union ..	64,687	20,682	36,781
Finland	43,164	22,398	5,969
Sweden	202,694	159,974	14,948
Norway	59,923	186,775	12,881
Iceland	20,405	27,021	2,796
Denmark	103,661	54,608	18,907
Poland	8,768	11,639	9,702
Netherlands	161,427	85,981	22,010
Belgium	112,791	96,510	11,208
France	29,889	36,729	16,082
Switzerland	26,245	23,938	3,768
Portugal	189,599	50,978	6,512
Spain	48,532	27,862	3,813
Czechoslovakia ..	12,220	31,192	7,205
Yugoslavia	7,466	26,387	1,475
Greece	66,429	30,710	4,926
Turkey	129,468	99,766	7,684
Dutch East Indies ..	35,341	36,341	2,692
Dutch West Indies ..	6,511	8,525	830
Portuguese East Africa	21,558	6,317	6,942
Lebanon	32,424	21,137	—
Egypt	128,294	68,607	13,176
Iraq	88,399	73,908	5,530
Iran	137,027	86,939	16,345
Burma	22,803	98,307	5,337
China	15,650	55,895	4,116
United States of America	9,026	9,025	5,839
Mexico	10	6,090	1,466
Colombia	6,158	1,540	845
Venezuela	50,201	25,104	2,936
Chile	2,089	3,814	6,635
Brazil	20,132	189,807	11,164
Uruguay	918	15,903	1,790
Argentine Republic ..	219,269	128,914	45,452
Other Foreign Countries	160,386	161,774	40,270
Total	5,953,426	4,823,763	1,134,284

exports of telegraph and telephone cables whose value for the nine months of this year has amounted to £5,729,428 against £2,408,877 last year.

Among other classes of goods, exports of domestic radio receivers show an improvement over the previous two months but remain at a lower level than last year. Nevertheless, the monthly total (£300,798) is not far short of

Table III.—Nine Months' Exports

Class	Jan.-Sept.,		Three-quarters 1938 Total
	1948	1947	
	£ million		
Wires and cables ..	16·9	9·6	3·2
Radio apparatus ..	9·0	7·4	1·5
Telegraph and telephone apparatus	8·3	4·7	2·2
Lighting apparatus ..	4·9	3·2	0·9
Other electrical goods ..	13·8	10·2	2·5
Electrical machinery ..	20·4	16·0	5·9
Portable electrically-operated machinery ..	1·9	2·1	0·3
TOTAL	75·2	53·2	16·5

the figure for nine months in 1938 (£330,798). Shipments of cooking apparatus continue to run at twice last year's rate and for the nine months have amounted to £1,318,278 (against £677,359). On the other hand there have been diminished exports of electrical heating equipment (£661,629 against £1,117,899 in the corresponding period of last year).

From Table II it will be seen that South Africa was again the largest customer for goods and apparatus, with Australia showing the greatest increase. Other markets in which notable expansion has taken place are New Zealand, Southern Rhodesia, British East Africa, Argentina, Scandinavian countries, Egypt and Portugal. Against this there has been a contraction of supplies to several countries, notably India and Pakistan, Palestine and Brazil.

In the machinery section, motors, especially fractional-h.p. types, were again outstanding. Exports of those under ¼ h.p. were valued at £127,200 compared with £94,122 in August and £117,500 in July. Last month's exports of generating plant under 200 kW were also greater than in the two previous months; in the case of larger equipment, the amount sent abroad continued to be limited by home requirements, the January–September value being £1,544,074 against £3,273,112 last year.

The level of electrical imports shows little change and is roughly the same as last year. The chief supplying countries (goods and apparatus only) were as follows, with September, 1947, figures in parentheses:—United States, £60,694 (£84,821); Canada, £42,423 (£87,225); Netherlands, £12,073 (£26,806); Switzerland, £12,939 (£8,447); other British countries, £27,184 (£4,027); and other foreign countries, £51,273 (£22,625).

COMMERCE and INDUSTRY

Building Licensing. Commissions in the Navy.

THE limit of £100 for the twelve-month period to 30th June next to the amount of work which may be done to a building without the need for a licence is to be raised on 1st November to £1,000 for certain classes of buildings. It will still be necessary, however, for applications to be made for the requisite timber and steel, supplies of which remain inadequate. The buildings included in the relaxation are factories, warehouses, farm buildings, schools, universities and office buildings with a floor area of 10,000 sq ft or over.

Export Goods in Home Market

From time to time the Board of Trade is asked by exporting firms whether goods may be delivered from the export quota to residents of the United Kingdom against payment from accounts in other parts of the sterling area, and it wishes to make it clear that such transactions are directly contrary to the national interest. They should not appear as exports in the returns made by industry to the Board of Trade, nor should they be recorded against export targets.

Prices of "Frustrated Exports"

The Board of Trade, in consultation with the Central Price Regulation Committee, has made the Miscellaneous Goods (Frustrated Exports) (Maximum Prices) Order, 1948, which came into operation on 25th October.

This Order applies to certain goods for which markets cannot be found abroad, which are now being released to the home market. Where these goods are still owned by the manufacturer they are covered by the ordinary price control Orders but where the goods have already passed to an exporter special price control provisions are required.

The exporter's maximum price is the *lower* of: (a) the price paid by him, together with certain specified expenses, plus 5 per cent; and (b) the wholesaler's maximum price or, where applicable, ceiling price, as fixed by the maximum price Order (if any) covering goods of the same description. The wholesaler's, distributor's and retailer's maximum prices are those fixed for those classes of trader and of goods in the maximum price Orders except that in computing maximum price the price paid to the exporter is substituted for the price paid to the manufacturer. Where there is no relevant maximum price Order the maximum prices are those permitted under the Prices of Goods Act, 1939. The new Order revokes the Miscellaneous Goods (Import and Prevented Export) (Maximum Prices) Order, 1943 (S.R. & O. 1943 No. 1250).

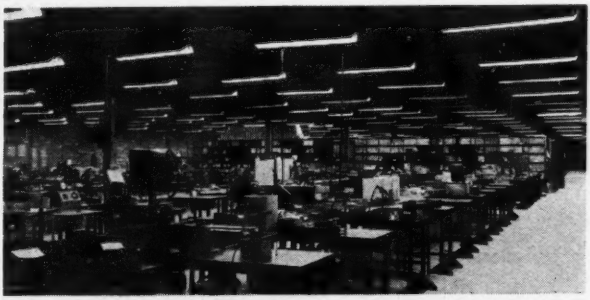
The Price Controlled Goods (Frustrated Exports) (Restriction of Resale) Licence, 1948, which also came into operation on 25th October, authorizes an exporter to whom the certificate has been granted and a wholesaler buying from him to re-sell "frustrated exports" covered by the certificate otherwise than by retail.

Revised Purchase Tax Notice

Notice No. 78 (Goods Chargeable with Purchase Tax), issued by the Commissioners of Customs and Excise, has been revised and copies of the new edition are being sent by local Collectors of Customs and Excise to traders registered for purchase tax purposes and to trade associations. The revised Notice supersedes Notices Nos. 78 (February, 1943), 78C (February, 1948), 78L (April, 1948) and the supplement thereto (July, 1948).

Factory Lighting

A planned fluorescent lighting installation to suit the eventual bench layout has been carried out in the new factory under construction at Bathgate for the Telegraph Condenser Co., Ltd., utilizing over 650 Ekco-Ensign 5-ft 80-W fluorescent fittings. In the condenser assembly bay shown in the accompanying picture, the fittings are mounted in even rows with 14 ft 6 in. between each lamp and 8 ft 6 in. between rows, giving balanced overall lighting. The metal reflectors of this fitting have maximum light



Fluorescent lighting at the Bathgate works of the Telegraph Condenser Co.

output below the horizontal with a dispersive distribution and a 20 deg cut-off and are placed at a height of 11 ft above floor level, giving a light value on the working plane of 10/11 lumens per sq ft. Donald Smith & Partners, 7, Royal Bank Place, Glasgow, C.1, were the consulting engineers for the installation.

R.N. Electrical Branch Commissions

The Admiralty announces that it will offer short service commissions in the Electrical Branch of the Royal Navy to former officers of the Torpedo, Special, Electrical, and Air Branches of the R.N.V.R. who were employed on technical duties connected with radar, wireless, air radio, air electrical, or general electrical equipment. The period of service will be five years on the Active List, to be followed by four years on the Emergency List. Officers who complete the full period of five years on the Active List will be eligible for a gratuity of £500, tax free, and, under certain conditions, *pro rata* for shorter periods. Candidates must have completed one year's mobilized service as an officer, and be under the age of thirty-five on 1st January, 1949. Candidates will be entered with the substantive rank, and with the relative seniority in that rank, which they held at the time of their release. They will be eligible for promotion under the normal rules. Applications should be made to the Director, Naval Electrical Department, Admiralty, Queen Anne's Mansions, London, S.W.1.

Reyrolle Distributors' Conference

A conference was recently held at the works of A. Reyrolle & Co., Ltd., Hebburn-on-Tyne, of a number of wholesalers (Reyrolle distributors) interested in the stocking and distributing of the company's " over-the-counter " products which include plugs and sockets, small air-break switch and fuse units, house service supply units, kitchen control units, cartridge-fuses and the like. These products are now being manufactured at the company's new Ashington factory, and during the conference which lasted for two days an opportunity was taken of visiting and inspecting these workshops. Among those who attended were Mr. I. E. Mold a director of the company, Mr. H. Riley, of Sheffield, who is this year's president of the Electrical Wholesalers' Federation, and a number of other members of the Federation.

New Portuguese Company

The Counsellor (Commercial) at Lisbon has reported the formation of a new company to be known as Empresa Fabril de Maquinas Electricas S.A.R.L. This firm is to manufacture electric motors, transformers, starters for electric motors and other electrical material, and is also to run a sales and service organization. The presnt registered capital is £10,000, which may be increased to £120,000, ; the company is backed by the Cia. Uniao Fabril. Another large shareholder is the Ateliers de Constructions Electriques de Charleroi, which paid for some of the shares which it holds by making available to the new company all its electrical patents, plans, designs and models. The Companhia Uniao Fabril, also has a considerable part in the affairs of the Companhia Portuguesa de Cobre, which, like the Empresa Fabril de Maquinas Electricas, is at Matosinhos. The C.P. de Cobre will supply the copper requirements of the electrical firm.

Electricity Output

The output from solid-fuel fired generating stations in the week ended 15th October was 805·2 million kWh against 800·5 million in the previous week and 744·3 million in the week ended 17th October, 1947. Stocks of coal at electricity undertakings increased from 4,402,600 tons at 9th October to 4,445,400 tons at 16th October.

Mechanical Handling Convention Papers

At the recent Mechanical Handling Exhibition and Convention papers were read by various authorities on many aspects of mechanical handling. A large number of requests have been received for reprints of these papers and these will be available shortly. The papers are being reprinted separately in brochure form and can be ordered (price 1s. each, post free) from the Publishing Department, Dorset House, Stamford Street, S.E.1. A complete list of the papers is available on request from the Editor, *Mechanical Handling*, at the above address.

Scottish Cables Export Orders

Among recent overseas contracts secured by Scottish Cables, Ltd., are one valued at £130,000 for Bermuda and another, for 33-kV cables valued at £60,000, for the New South Wales Government Railways.

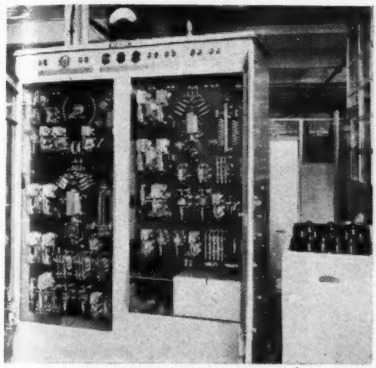
Bottling Beer

Referring to our article on Ind Coope & Allsopp's new beer bottling store at Burton-on-Trent in our issue of 8th October, G. Hopkins & Sons, Ltd., give us further details of the five pasteurizers they supplied. These impressive machines are approximately 70 ft long and 15 ft wide, covering in all a floor space of approximately 5,300 sq ft. Each of four machines handles up to 600 dozen bottles per hour, whilst the latest one, the Hopkins " Highbury Super " is capable of handling up to 1,000 dozen per hour. Each machine has a 1½-h.p. 3-phase induction motor for the main drive and four 7½-h.p. 3-phase induction motors direct coupled to the pumps for circulat-

ing the liquor for the actual pasteurization. In addition, there are 1½-h.p. motors for driving the feed conveyors and discharge conveyors.

Multi-Motor Panel

Brookhirst Switchgear, Ltd., has supplied electrical control equipment to P. R. Jackson & Co., Ltd., for use on what is probably the largest gear hobbing machine in the world.



Brookhirst multi-motor panel with doors open (left) and one of the main control stations (right)

Control gear is centralized in one cubicle, as shown in the accompanying illustration, where a common isolating switch is provided. Six motors, operating from 220/440-V d.c., are controlled from four separate control stations, a main station being situated on either side of the machine and two subsidiary stations on the machine saddle. The main stations give control of the hob spindle, longitudinal traverse, lubrication pump and coolant pump drives. Those on the machine saddle control the cross traverse and longitudinal traverse drives. The divide head drive is operated by means of limit switches actuated from a mechanical positioning device. By means of push-button control, the hob spindle and longitudinal traverse motors can be started and inched in both forward and reverse directions and their speeds can be varied.

Works Visit

The Minister of Supply, Mr. G. R. Strauss, visited the Woolwich works of Siemens Brothers & Co., Ltd., on 5th October. On arrival at the works the Minister and his party were received by Mr. G. W. Giffin, director and general works manager, Mr. S. W. Lumb, the company's secretary and Mr. W. G. Patterson, deputy works manager. Mr. Baker, the works labour and welfare superintendent, introduced a number of old employees to the Minister including Mr. C. Cooper, Mr. E. Cooper and Mr. H. Probert, each of whom had been with the company for fifty-three years. Mr. Strauss toured the works and after lunch addressed the employees over the works loudspeaker system.

Scottish Ironmongers' Protest

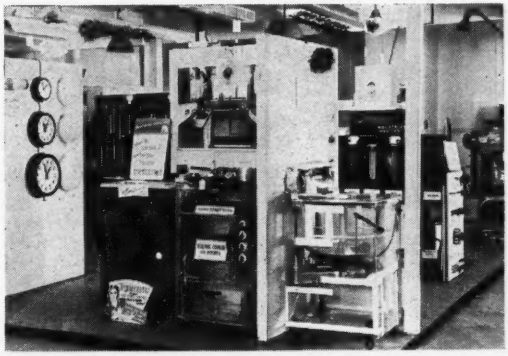
Edinburgh, Leith and District Ironmongers' Association, which represents the ironmongery trade in Edinburgh and South-East Scotland, has protested against the direct trade with the public undertaken from the showrooms of the South-East Scotland Electricity Board in George Street, Edinburgh. There are nearly 100 members of this Association, most of whom are in a position to accept orders from the public for household electrical equipment, and the Association submits that the action of the Board is bound to deprive the private trader and retailer of much of his normal business.

Lamp Publicity

The new advertising material which Cryselco, Ltd., is issuing includes two wall showcards in colour, one relating to the company's general range of lamps and the other to its automobile lamps. Particulars of voltages, prices, etc., are given on the back of each showcard. The company has also available for the trade an illustrated price list of fluorescent lamps. Further price lists with the same frontispiece as the showcards will be available shortly.

Wembley Civic Exhibition

There was a strong electrical representation at the Wembley Civic Industrial and Commercial Exhibition which closed last Saturday after over a fortnight's run. A number of electrical manufacturers in the district had stands and



Eastern Electricity Board's stand at the Wembley Exhibition

the Eastern Electricity Board arranged a varied display which is illustrated. Emphasis was laid on the industrial and commercial aspects of electricity but there was also a good deal of domestic apparatus on view.

Comprehensive Lighting Scheme

Wentworth Castle, Stainborough, Yorks, has recently been acquired by the Barnsley Education Committee for use as a training college for women teachers and a new lighting scheme has been carried out by the Barnsley District of the Yorkshire Electricity Board, and planned by the British Thomson-Houston Co., Ltd., which also supplied the necessary equipment. To meet the anticipated load a 200-kVA substation has been erected and a ring main distribution system is employed throughout the Castle.

Fluorescent lighting in the dining room of Wentworth Castle

The electrical equipment installed possesses many original features of design. A particularly noteworthy aspect is the lighting, which conforms to the outstanding decorative and architectural characteristics of the interior, and fully accords with the building regulations of the Ministry of Education.

The kitchens are in "wet" and "dry" sections. The dry kitchen has a double-oven range (30·6 kW); a general purpose oven (16 kW); a 40 cu ft refrigerator; a 150-gallon water storage heater (30 kW); a two-compartment fish fryer (18 kW); two 6-ft hot-cupboards (5·6 kW); and a 10-gallon vegetable steaming pan (3·4 kW). Four 5-ft fluorescent lamps in open type reflectors give shadowless illumination.

In the wet kitchen are a steaming oven (9 kW); two 20-gallon boiling pans (7·2 kW each); and a potato peeling machine, and in an annexe are an electric dish-washing machine and a hot-cupboard. Three corrosion-resisting "Perspex" enclosed fittings have been installed, each accommodating one 80-W "natural" fluorescent lamp.

Special attention has been given to the lighting of each of the apartments, including the entrance hall, main staircase, principal's office, dining room (illustrated), Students' common room, six lecture rooms, needlework room, art room, tutors' bed-sitting rooms, laboratories, assembly hall and students' common room.

Naval Maintenance Depot

The Admiralty is to set up at Urlay Neek, Eaglescliffe, near Darlington, a central depot for the maintenance of naval engineering and electrical spare parts and their immediate supply to ships and shore establishments throughout the country and abroad. It will be officially called Spare Parts Distribution Centre (U.K.) and should be in full peacetime operation in two years. It will then employ about 740 technicians and other workers under the supervision of naval officers.

Australian Television Company

The formation of an Australian television company, whose capital will be provided equally by Pye, Ltd., of England, and Electronic Industries of Australia, was announced on 20th October by the chairman of the latter company. According to *Reuter's Trade Services* the company will operate under the name of Pye Australasia, Ltd. The chairman states that regular television cannot be expected in Australia for two years.

Non-Ferrous Metals Directorate

The Disposals Section of the Ministry of Supply Non-Ferrous Metals Directorate has moved to 66/72, Gower Street, London, W.C.1 (telephone, Museum 8044; telegraphic address, Metrol, Westcent, London).

Government Help Sought

The *Western Mail*, reporting the visit of two M.P.s, Messrs. Emlyn Thomas and D. J. Williams, to the factory of Thorn Electrical Industries, Ltd., on the Hirwaun Trading Estate, says that the works manager (Mr. R. Lawler) told them that the works would have to close in December unless the Government provided some sort of assistance. The factory

produces radio sets, vacuum cleaners and irons and practically all the employees are disabled men. The position is attributed to the latter circumstance as, according to Mr. Lawler, the factory is unable to compete with works employing female labour. The factory could absorb all the disabled men in the area if the Government gave the company reasonable assistance. The M.P.s promised to endeavour to obtain this assistance.

Steel Nationalization

In the course of the King's Speech at the opening of Parliament on Tuesday it was stated that a measure would be laid before Parliament "to bring under public ownership those companies extensively engaged in the production of iron ore, or of pig iron or steel, or in the shaping of steel by a rolling process."

A Bill would also be presented to amend and consolidate the law of patents and designs.

British Components Exhibition in Stockholm

The first exhibition of British components and test gear for the radio and electrical industries to be arranged abroad was held in Stockholm from 18th to 22nd October. The exhibition was organized by the British Radio Component Manufacturers' Federation and thirty-six companies were represented. The exhibition was intended to show that British manufacturers are able to supply to Sweden components, superior in design and quality, which were previously bought from Germany.

Tube Railway Extension

It was announced this week that the Minister of Transport, Mr. Barnes, would officially open the London Underground Railway Central Line extension on 21st November. In the west the line is extended 4¼ miles from Greenford to West Ruislip, and in the east 5¾ miles of line are added from Woodford to Loughton with a branch from Woodford to Hainault. The extensions are the largest to be completed on the Underground for thirty-one years and have cost £2 million.

Commercial Travellers' Benevolent Institution

The Annual Court of Governors of the Commercial Travellers' Benevolent Institution will be held on 29th December next at 4B, Frederick's Place, Old Jewry, London, E.C.2.

Paint Company's History

To celebrate their 125th anniversary (which occurred in 1946), and to place on record their wartime activities, Jenson & Nicholson, Ltd., manufacturers of Robbialac paints, have published a book entitled "The Story of an English Firm." This is a beautifully produced volume with many illustrations in colour and traces the history of the company from its early days to the present time when its activities include the manufacture of coloured finishes for a variety of electrical appliances.

Scottish Contractors' Complaint

The Glasgow correspondent of *The Times* reports that Scottish firms are protesting against the practice of the British Electricity Authority of including in contracts a clause that the interpretation of the terms of the contract shall be according to English law. It is contended that this arrangement would mean great inconvenience and expense to Scottish firms which would have to seek legal advice in England instead of engaging Scottish lawyers.

Trade Publications

Dawe Instruments, Ltd., Hanwell, London, W.7.—Two technical leaflets on the 1210-A frequency meter and photo-electric pick-up and the 1250-A (Scophony pattern MK2) dynamic balancing machine.

Merchant Adventurers, Ltd., 43, Portland Road, London, W.11.—Priced folder on "Fluorelume" "C" series fluorescent lighting fittings.

Erie Resistor, Ltd., Carlisle Road, The Hyde, Hendon, London, N.W.9.—Application data booklet (issue 3) on high stability resistors, miniature wirewound vitreous resistors, high voltage double-cup silvered ceramic capacitors and triple feed Hi-K ceramic capacitors.

Trade Announcements

In our last issue we stated that the address of **Richard Johnson & Nephew, Ltd.,** is now Bush House, Aldwych, London, W.C.2. This is the company's London office address only.

Metropolitan Distribution, Ltd., has re-opened its branch at 1, Martin Street, The Octagon, Plymouth (telephone: 2040), where representative stocks of radio and electrical equipment are carried. The manager is Mr. E. May.

From 1st November the London office of **Electricity Meter and Allied Industries, Ltd.,** will be at British Columbia House, 1-3, Regent Street, London, S.W.1 (Whitehall 2706).

Information Department

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"Beta" electric washing machines.

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Export Targets for 1949

THE President of the Board of Trade, Mr. Harold Wilson, announced on Monday that the end-1949 target set for United Kingdom exports as a whole was 155 per cent of the volume of exports in 1938. The monthly rate which it was hoped to attain for electrical goods and apparatus was £7·55 million, which compared with £7·07 million for end-1948, and represented 270 per cent of the 1938 volume. The machinery target was £24·48 million (against £22·06 million) and 228 per cent of the 1938 volume. The greatest increases in electrical exports were expected to come from wires and cables, with smaller increases in radio, telegraph and telephone apparatus. With regard to machinery, exports of electrical machinery in particular were expected to be larger.

The end-1948 target of 150 per cent of 1938 volume was within sight of achievement, but it was thought that there would be some slowing down of the very rapid rate of expansion of total exports which had occurred during the past eight months. Exports of electrical goods during the first three quarters of 1948 averaged per month (in £ million) respectively 5·31, 6·21 and 6·17 (or 198, 221 and 218 per cent of the 1938 volume). The corresponding figures for machinery of all kinds were 18·83, 20·89 and 21·80 (176, 196 and 196 per cent of 1938 volume).

Most of the export categories were expected to show further increases during 1949, but in some cases the targets had had to be reduced below the end-1948 figures, largely because of severe import restrictions abroad and growing competition for overseas customers. In certain cases we should still be unable to meet the full demands of our overseas customers owing to continuing shortages of raw materials. It would almost certainly be necessary to make a number of detailed adjustments of targets as a result of further discussions with individual industries, and it was proposed therefore to publish a revised and more detailed list of targets by the end of the year.

"Design at Work" Exhibition

THE contribution of designers to the manufacture of products that work well, look well, last well and sell well is demonstrated at the "Design at Work" Exhibition produced jointly by the Royal Society of Arts and the Council of Industrial Design, and opened last Tuesday at the Royal Academy. The exhibition is also intended to stimulate the production of British goods of outstanding design in time for showing them to the world during the 1951 Festival of Britain. Among electrical items chosen for display are an H.M.V. iron and a Troughton & Young lighting fitting. The latter, which is constructed of anodized aluminium, is cone shaped, its extreme simplicity giving elegance and efficiency and rendering it suitable for many types of room.

How nearly two years of the closest collaboration between designers, engineers, sales staff and executives were required to perfect "Radiotime" apparatus (E. K. Cole, Ltd.) is depicted in a display showing the various stages in development—the production of paper models, the first prototype, working drawings, tooling, production prototype and final production. Another exhibit shows how the final design of a Murphy Radio television set was reached. Photographs of a portable radio receiver, electric cooker, electric railway coaches and a B.B.C. dramatic control panel are other examples of the designer's art.

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month from 20th October:—

STORK. No. 654,880, Class 9. Electrica instruments and apparatus included in Class 9, and measuring instruments, but not including coin-freed and counter-freed apparatus, pressure and vacuum gauges, power meters and engine counters and not including any goods of the same description as any of these excluded goods.—Miles Nadould Brushfield, Fleet Wharf, 22, Upper Ground, London, S.E.1.

MASCOL. No. 658,755, Class 9. Electric welding apparatus, electrode holders and electrodes.—Alexander Middleton, trading as Mascol Products Co., 19, Guildhall Chambers, Sandhill, Newcastle-on-Tyne, 1.

WESTRO. No. 662,931, Class 9. Thermostats.—West Road Co., Ltd., 2 and 3, Norfolk Street, Strand, London, W.C.2.

TEXICOLOR. No. 664,780, Class 9. Radio receiving and transmitting apparatus, radiogramophones, gramophones, loudspeakers, sound amplifiers and microphones, and parts (not included in other classes) of all such goods.—Gordon Arthur Willis, trading as "Raimo Raidio" Products, 1b, Old Torquay Road, Paignton, Devon.

STELLA. No. 648,194, Class 11. Installations for lighting, electric lamps and electric lighting fittings.—Stella Lamp Co., Ltd., Winchelsea Road, Harlesden, London, N.W.10.

SKY-GLO. No. 664,656, Class 11. Installations for lighting, heating and ventilating.—Benjamin Electric, Ltd., Brantwood Works, Tariff Road, Tottenham, London, N.17.

HOTPOINT (design). No. B661,630, Class 11. Refrigerators, refrigerating chambers and refrigerating chests, all being electrically-operated apparatus.—The Hotpoint Electric Appliance Co., Ltd., Crown House, Aldwych, London, W.C.2.

UNILATOR. No. 663,298, Class 17. Electrical insulation material and china insulators.—United Insulator Co., Ltd., Oakcroft Road, Tolworth, Surbiton, Surrey.

Electrostatic Voltmeters

Theoretical Considerations of Design

By Major E. H. W. BANNER, M.Sc., M.I.E.E., F.Inst.P.

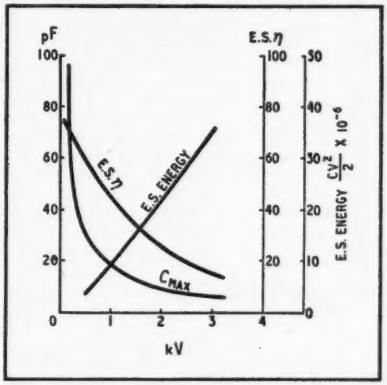
WHILE general design formulæ exist and are useful to a limited extent, the importance of electrostatic efficiency and energy are less appreciated. The fundamental formula is $T = 0{\cdot}292 \times 10^{-6} V^2 \theta_1 K \frac{dC}{d\theta_1} \times \frac{\theta}{\theta_1}$, where T = torque in cm-gm at full-scale deflection ($\theta°$), V = voltage (r.m.s., or d.c.) for deflection $\theta_1°$, K = permittivity of the insulating medium (air) and $\frac{dC}{d\theta_1}$ = rate of change of capacitance of the electrode system in pF per degree at deflection θ_1 in air.

The formula is of use for indicating the parameters involved, but it is not of great application, especially to high-range instruments, owing to the difficulty of calculating the very small capacitances involved, especially the minimum capacitance with the pointer at zero, as this is largely due to stray capacitance and to the edge fringing effect. Frequently the stray capacitance exceeds the working capacitance at zero, so that an initial error in calculation may completely upset the value of torque calculated for any given design.

Earlier post-graduate work by the author at the University of Birmingham led to a commercial design which has proved satisfactory over a number of years in which the construction embodies moving vanes and fixed inductors, which may be assembled with various spacings for ranges from 3·5 kV down to 300 V and to 150 V in a specially deep case.

The theoretical maximum deflection of 90° is reduced in practice owing to the need for a lead to be given to the moving system at zero in order to start it moving. The amount of lead is the minimum with small spacings, but cannot well be less than 10°. The deflection is 80° for the 150 V range and 70° at the highest range.

Analysis of the theoretical design of the lowest range shows that over the middle of the scale the scale-shape is very nearly linear with a value of $dC/d\theta$ of unity, C being in pF and θ in degrees. This is effective from 80 V at 33° to 120 V at 67°. At the latter voltage $T = 0{\cdot}292 \times 10^{-6} \times 120^2 \times 1 \times 80/67 = 0{\cdot}005$ cm-gm, which is the nominal spring torque for this range, but it is 0·01 to 0·02 for the other ranges. Electrostatic efficiency is Dr. Drysdale's term and analogous to electromagnetic efficiency for other instruments. It is $\frac{C_{max} - C_{min}}{C_{max}}$ where C_{max} and C_{min} apply respectively to full-scale and zero. This should be a maximum for a good design and in the present 150 V instrument it reaches 76·5 per cent. It is 50 per cent for the 750 V range and 25 per cent at 2,000 V. This progressive drop is due to increased fringing as the spacing increases. The graph shows C_{max} and electrostatic efficiency over the range. The value of 76·5 per cent is considerably better than values of electromagnetic efficiency for moving-iron instruments. A compromise of electrostatic efficiency and torque is necessary for best performance and a correct balance of these factors was one aim of the design.



Electrostatic efficiency and energy graphs

The electrostatic energy is $CV^2/2$, where C is in farads and V in volts. It increases nearly linearly with the voltage, for a given design; thus the V^2 term is offset by the reduced C as the voltage range increases. The energy is related inversely to the electrostatic efficiency, showing again that a small minimum capacitance is required on all grounds whereas a greater maximum capacit-

Note: 1 e.s.u. (volts) = 300 practical volts.
1 e.s.u. (capacitance) = 1 $\mu\mu$F approx.

ance, although leading to a higher electrostatic efficiency, also tends to cause more current loss at high frequencies.

The theoretical considerations of electrostatic efficiency and electrostatic energy are thus seen to be of practical importance in assessing a design. The electrical efficiency of low-range instruments is better than that of high ranges.

The instruments described are made by Ferranti, Ltd., to whom thanks are due for permission to refer to the design.

NEW BOOKS

Guide to 1947 Act : Polishing and Plating

The Electricity Act, 1947. By Sir John Dalton, A.M.I.E.E., F.C.I.S., Barrister-at-Law. Pp. 278. Butterworth & Co. (Publishers), Ltd., Bell Yard, Temple Bar, W.C.2. Price 21s.

This useful commentary on the most important of all the Electricity Acts, which amended or cancelled many sections of earlier measures, is in three main parts, one of them covering the Hydro-Electric Development (Scotland) Act, 1943, with three appendices.

The first section consists of a survey of earlier legislation and the steps which led up to the 1947 Act, including the many reorganization plans which were put forward. This is followed by an informative study of the Act's main proposals.

The second part contains the Act itself with useful notes appended to each section. A commentary is also attached to the Scottish Act which is reproduced in the third section. The appendices deal respectively with Statutory Rules and Orders and Statutory Instruments made under powers conferred by the 1947 Act; miscellaneous taxing and rating enactments; and regulations which have been made under the Scottish Act.

Sir John Dalton's work is supplementary to and largely supersedes Will's " Law Relating to Electricity Supply " which last appeared in 1932.

—J.H.C.

Electrolytic Polishing and Bright Plating of Metals. By S. Wernick, PH.D., M.SC. Pp. 193; figs. 69; subject index. Alvin Redman, Ltd., Whitfield Place, London, W.1. Price 30s.

No book on these subjects has previously been published in this country, so the appearance of this one must be welcomed. It was a happy thought to combine the two processes in one volume. From an industrial view point both types of process lead to the same goal, namely the production of highly " polished " metals or plated coatings with improved features or at reduced costs.

The author deals with the electrolytic polishing of stainless and carbon steels, aluminium, nickel, copper and silver cadmium, platinum, palladium and rhodium. Unfortunately, however, quite a lot of the information he gives is rather vague and the reader will find it difficult at times to sort out where the author describes processes of which he has first hand information and could recommend or where they are merely details describing patented processes, perhaps never applied industrially and apparently, sometimes, even superseded by later inventions from their own originators. From the point of view of those interested in the electrical equipment for electropolishing it is also unfortunate that Dr. Wernick only makes the briefest references here and there in his text and does not devote a single chapter, or even a section, to this important aspect of his subject.

In addition to references at the end of each chapter, there is a bibliography of 40 pages at the end of the book.—S.W.B.

The Electrolytic Capacitor. By A. M. Georgiev. Pp. 191; figs. 72; index. Crosby Lockwood & Son, Ltd., 39, Thurloe Street, London, S.W.7. Price 15s. in U.K.

This book, published in America in 1945, is written by an engineer with considerable experience of the design and manufacture of electrolytic capacitors.

In the early part of the book the author compares dry, wet electrolytic and non-electrolytic types and follows this by descriptions of the construction and processing of parts, information on electrolytes and spacers, theories of the dielectric film and its formation, winding, impregnation of dry types, routine and special tests, design, development trends and recommendations as to circuit use.

The general information on manufacturing processes and difficulties is interesting, while the information on the behaviour of electrolytic condensers under adverse conditions will be a guide to all those concerned with the use of these components in electrical apparatus. For those requiring more specific information on any branch of the art, recourse may be had to the appended bibliography and list of U.S. and other patents.

The book has only 159 pages of reading matter, but the style is condensed and informative. Altogether, a very useful, readable compendium of information on the electrolytic capacitor art.—L.C.W.

Book Received

Spectroscopy and Combustion Theory. By A. G. Gaydon, D.SC. Pp. 242; figs. 13; index. Chapman & Hall, Ltd., 37, Essex Street, W.C.2. Price 25s.

Spot Welding Mild Steel

FOR the first time in this country it has been possible to recommend the absolute value of each of the main variables required for optimum results in spot welding mild steel sheet. The recommendations are based almost entirely upon actual experimental results obtained by investigators of the British Welding Research Association during the past three years. Much of the experimental data from this work have been published in report form, so that the facts leading up to the recommendations are easily available.

To set machines for a given job on a purely arbitrary basis makes it difficult to transfer established settings from one machine to another, but now that suitable instruments have become available there are no valid reasons why adequate instrumentation cannot be adopted in production. The recommendations cover thicknesses of low carbon mild steel sheet ranging from 20 to 14 s.w.g. inclusive and will ultimately cover a wider range. Actual dimensions of the spot welds obtained are given and values stated of the order of strength to be expected of the joints. Permissible edge distances are discussed, data are given upon the settings required for spot welding multiple and different thicknesses, and reference is made to the effect of using one electrode of a normal truncated cone shape with the other electrode of the pad type to preserve surface finish and avoid indentation.

Full details are given in the current issue of "Welding Research" which is a supplement to the transactions of the Institute of Welding.

Staff Location Systems

THE Codes of Practice Committee has issued as a draft for comment Code 327.402 "Staff Location Systems," prepared by a committee convened by the Institution of Electrical Engineers. This Code is intended primarily for the requirements of new buildings, but it is also applicable to installations in existing buildings.

The following types of systems are described: (*a*) Those employing a single lamp, bell or other sounder at each signal point. (*b*) Those employing two or more lamps at each signal point. (*c*) Those employing electro-mechanically operated indicators. Information is given on characteristics of the signals (whether audible, visual or a combination of both), the type of equipment used and the necessary wiring systems. As it is usual for staff location and private telephone systems to be linked, this aspect is fully covered by the Code.

Power supply arrangements are considered and there are recommendations on the choice of the source of power and operating voltages for particular conditions and types of installation; guidance is also given in the selection of suitable cables, wires and fittings.

An appendix, "Segregation of Circuits," defines "very low" voltages and discusses electrical interference and safety requirements in relation to telecommunication circuits. A further appendix describes a number of types of cables and wires, not at present covered by British Standards, and supplements the usual list of British Standard materials, appliances and components given elsewhere in the Code.

Comments are invited and should be submitted by 1st December. Copies may be obtained from the British Standards Institution, 24-28, Victoria Street, London, S.W.1, price 3s. (proof reference CP(B)790).

New I.E.E. Sub-Centre

A SUGGESTION that consideration should be given to the reduction of the present high cost of power station buildings was made by Mr. C. C. Pimble, engineer of the North Staffordshire Sub-Area (Stoke-on-Trent) of the Midlands Electricity Board, in his address as first chairman following the inauguration at Stafford on 15th October of a North Staffordshire Sub-Centre of the Institution of Electrical Engineers. The area had hitherto formed part of the South Midland Centre, but distance made it difficult for Stoke-on-Trent members to take an active part.

The president of the Institution, Mr. T. G. N. Haldane, attended the inauguration ceremony and said he believed the step taken would be of advantage to the Institution as a whole.

Mr. Pimble, in his address, described the power station at Meaford, the first post-war power station to be brought into commission. The capital cost of such projects was now ranging about £50 per kW of plant installed. The buildings now being erected were "certainly good for a hundred years," whereas the plant they housed would probably be semi-obsolete in twenty years. Could there not be devised some form of construction midway between a galvanized sheeting structure and the elaborate buildings of to-day ?

Telephone Type Relays

SWITCHING relays of the d.c. telephone type were the subject of Mr. A. Mason's address as chairman of the London Students' Section of the Institution of Electrical Engineers. Most of his remarks reflected general G.P.O. practice, being largely descriptive. The selection of materials for making contacts and the shapes of the latter for different duties were dealt with, indicating that duplication of contact points decreased the incidence of high resistance faults due to dirt by a ratio of one to ten as compared with a single contact point. Comments on the magnetic circuit and coil making stressed the need to arrange for the coil to be permanently connected negatively relative to the core, so as to minimize the effects of corrosion in the presence of moisture.

FINANCIAL SECTION

Company News
Stock Exchange Activities

Reports and Dividends

The General Electric Co., Ltd.—The need of industry to retain capital for modernization was urged by Sir Harry Railing (chairman), speaking at the annual meeting held on 21st October. It was axiomatic, he said, that our present standard of living could only be maintained or improved by an increase in production. To realize this more research facilities, more modern machinery and more horse-power for each worker must be provided. The capital which prudent companies had always ploughed back into their business was now heavily taxed, and it was becoming increasingly difficult to provide out of the company's savings, the reserves necessary for capital replacement, let alone modernization. It would also be increasingly difficult to attract outside savings, unless the investors could expect a seasonable return.

Sir Harry gave the following figures showing how the company's income was distributed:—Materials, 34·7 per cent; wages and salaries, 32·2 per cent; operating expenses, 20 per cent; United Kingdom taxation, 6·4 per cent; profits reinvested in the business, 3·3 per cent; depreciation, 1·9 per cent; dividends, 1·5 per cent.

In reviewing the accounts, Sir Harry mentioned that the stock of the company's subsidiary owning electricity supply undertakings had been exchanged for £3,700,000 British Electricity stock. At some future date a further permanent increase in capital would be required to finance the company's expansion.

Despite difficult production problems the company had increased its production and sales both in value and in volume, especially in the export market. Orders received during the year also increased considerably, but there had been a decline in consumer goods during the latter part of the financial year, which had since continued, largely due to the restricted use of electricity due to the shortage of plant.

At their factory at Shaw they had started their first completely modern plant for machine production of glass tubing from a tank furnace especially designed for the duty, and they were now able to meet the increasing demand for fluorescent lighting. At Durham they were making an increasing contribution towards the production of tungsten filament lamps, while at their Yorkshire and Walsall factories good progress was being made in the production of cooking and domestic equipment. The production of motors for domestic equipment at Walsall had enabled them to use space previously occupied at Witton for the increased production of loom motors for cotton mills. Extensions were now in progress at Witton and at the Fraser & Chalmers works which would enable them to give favourable deliveries for power stations and industrial electrical and mechanical plant, especially for the steel, shipbuilding and mining industries.

After reviewing some of the company's major activities during the year Sir Harry said that their total exports in 1946-47 represented an advance of 83 per cent over 1938, and those for 1947-48 an advance of 177 per cent. Their present monthly average rate of shipments represented an advance of 247 per cent over 1938, which was considerably higher than the task set them.

Telephone Properties, Ltd.—In his statement which has been circulated with the report and accounts, Sir Alexander Roger (chairman) says that for the two years 1946 and 1947 goods to the value of £338,750 have been shipped from Great Britain to Venezuela for the Nacional Company. These goods comprised telephone supplies mainly in the form of exchange equipment and cables. In spite of the substantial number of new subscribers added to the system since the end of the war, the waiting list continues to grow, and to date is in the neighbourhood of 18,000, the highest yet reached.

The London Electric Wire Co. & Smiths, Ltd., announces that the interim ordinary dividend will be paid this year at the end of October (instead of as usual on 30th June). In consequence the dividend has been raised to 4 per cent, representing a high proportion of the total dividend for the year. For 1947 the distribution was 10 per cent, less tax, comprising an interim of 2½ per cent, and a final of 7½ per cent.

The Radio & Television Trust, Ltd., is paying the preference dividend for the half-year to 30th September last and interest on the sinking fund certificates for the same period. The ordinary capital, which received 40 per cent for 1945-46, had no payment for 1946-47.

Ferranti, Ltd., report a trading profit for the year ended 30th June last of £397,201, compared with £406,651 for the preceding year. After making provision for tax the net profit was £143,388 (against £105,297). The ordinary dividend is unchanged at 6 per cent tax free.

The British Electric Traction Co., Ltd., announces interim dividends of 4 per cent on the 8 per cent non-cumulative preferred ordinary stock and 15 per cent (same) on the deferred ordinary stock.

Hopkinsons, Ltd., have declared an interim dividend of 7½ per cent (same).

J. & F. Stone Lighting & Radio, Ltd., reports a profit for the year to 30th June last of £274,861, as compared with £303,039 for the preceding year. Taxation requires £167,500, and the net

profit is £107,361 (against £148,839). The dividend for the year is maintained at 40 per cent by a final payment of 30 per cent.

Morphy-Richards, Ltd.—In our report of Mr. G. Wansbrough's statement in last week's issue, we inadvertently misquoted him as saying that in the home market the company was still able to meet the full demand for electric irons. This should have read "in the home market the company is still *unable* to meet the full demand."

Thos. W. Ward, Ltd., are paying a final ordinary dividend of 10 per cent, making 15 per cent, less tax, for the year. In the previous year the interim dividend was 3½ per cent, and the final 11½ per cent.

The **Ever Ready Co. (Great Britain), Ltd.**, is again paying an interim ordinary dividend of 15 per cent.

B.E.A. Finance

The subscription list opened and closed on 21st October for an issue of £100 million of British Electricity 3 per cent guaranteed stock 1974-77 at a price of 99½ per cent. Interest on the new stock is payable on 15th March and 15th September each year with a first payment of 12s. 6d. (less tax) per £100 stock on 15th March next. The stock is created under the provisions of the Electricity Act, 1947, and carries the guarantee of the Treasury. It is a full trustee security.

It was subsequently stated that the issue had been "very comfortably over-subscribed." Applications for amounts up to £50,000 were allotted in full, and those for higher amounts received about 77 per cent.

The main part of the proceeds of the present issue will be applied towards financing capital developments already in hand. These include the construction of twenty-five new power stations and fifty major extensions of existing stations, additions to the Authority's main transmission system and extensions by Area Boards of their distribution systems, to provide supplies of electricity for essential industrial and priority non-industrial purposes, including new housing schemes and food production.

New Companies

R. Hambley (Electrical), Ltd.—Registered 15th October. Capital, £100. Manufacturers of, and dealers in, electrical fittings of all kinds, etc. R. F. Hambley is permanent managing director. Regd. office: 12, Long Drive, South Ruislip, Middlesex.

Beme Electronic & Marine Equipments, Ltd.—Registered 14th October. Capital, £3,000. Directors: F. P. Parfitt and Comdr. Robert Knight (retd.). Regd. office: Aldwych House, Aldwych, W.C.2.

W. M. Webb, Ltd.—Registered 14th October. Capital, £500. Manufacturers of, and dealers in, wireless and television sets, gramophones, sound reproducing machines, electricians, radio and electrical engineers, etc. W. M. Webb is the first director. Regd. office: 12, Hatfield Road, Potters Bar, Middlesex.

S. G. Thaine (Electrical Installations), Ltd.—Registered 7th October. Capital, £1,000. Electricians, mechanical engineers, manufacturers and workers of, and dealers in, electricity, etc. Directors: S. G. Thaine, S. A. MacEwen and I. F. Thaine. Regd. office: 190, Brent Street, Hendon, N.W.4.

William Gartside, Ltd.—Registered 7th October. Capital, £2,000. To acquire the business of an electrical engineer and contractor, etc., heretofore carried on by W. Gartside at 13, Kay Street, Rawtenstall, Lancs. Directors: W. Gartside and Ruth Gartside. Regd. office: 13, Kay Street, Rawtenstall.

Burn & Co. (Wholesale), Ltd.—Registered 7th October. Capital, £1,000. Wholesale dealers in dry and wet batteries, radio and television apparatus, etc. Directors: R. Burn, L. Jameson and H. Reay. Regd. office: 152, New Bridge Street, Newcastle-on-Tyne.

Multi-Broadcast (Guildford), Ltd.—Registered 16th October. Capital, £100. Relayers of television and radio programmes, etc. Directors: A. E. Limehouse and F. S. G. Scott. Regd. office: 24, Market Place, Rugby.

Multi-Broadcast (New Malden), Ltd.—Registered 16th October. Capital, £100. Relayers of television and radio programmes. Directors: N. Edyvean-Walker and A. R. Almond. Regd. office: 24, Market Place, Rugby.

Companies to be Struck Off Register

The names of the following companies will be struck off the Register at the expiration of three months from the dates stated unless cause is shown to the contrary:—19th October: Temde Electric Co., Ltd.; Welburn (Radio), Ltd. 22nd October: The Crystal Electric Co., Ltd.; Rapid Radio, Ltd.; Sparkes Electrical Co., Ltd.; Sterilectric, Ltd.; Wireless Rentals (Bolton), Ltd.

Increases of Capital

Supra Electrical Co., Ltd.—Increased by £2,000, in 1,000 30 per cent non-cumulative preferred ordinary and 1,000 deferred ordinary shares of £1 each, beyond the registered capital of £2,000.

Carliol House, Ltd.—Increased by £3,400, in £1 shares, beyond the registered capital of £313,900. On 6th April, 1948, the British Electricity Authority held 305,319 shares.

Bankruptcy

R. A. Squires, carrying on business as Radiotois at 21, Station Road, Brixton, S.W.9, radio engineer and dealer in electrical and radio goods.—First meeting 3rd November and public examination 7th December, both at Bankruptcy Buildings, Carey Street, London, W.C.2.

STOCKS and SHARES

THE principal feature of this week's dealings in the Stock Exchange markets has been the introduction of the new British Electricity 3 per cent Stock, of which £100,000,000 was offered for subscription at 99½ per cent. Notwithstanding the huge amount of the loan, the list remained open for one day only. The price, 99½, was deemed to be attractive in relation to the quotations for other similar stocks in the Consol Market, and the whole amount was well over-subscribed. An initial premium of 3s. 9d. per cent was quickly passed, and the price hardened to 6s. 3d. premium, at which there was a rush on the part of the " stags " to unload their allotments. When the market settles down, the price, it is thought, may go to the neighbourhood of three figures. Meanwhile the previous Electricity Threes went back 5s. to 101¼. Transport 3 per cents at 99⅞ are unchanged on the week.

Industrial shares which qualify for the above title of high rank are marching closely with the gilt-edged market at a distance, in terms of yield, of about 1 per cent. Theorists hold that, with rearmament threatening the official policy of disinflation, conditions are turning in favour of equities at the expense of fixed-interest stocks. In practice, dividend limitation on the one hand, and " safety-first " considerations on the other, are serving to keep the rival attractions of the two markets in rough equilibrium.

Price Changes

Cable & Wireless ordinary stock, after a dip to 211, is 3 points lower on the week at 214½. Globe Telegraph & Trust ordinary, which move as a rule in correspondence with Cable & Wireless stock, have risen 2s. to 48s. upon execution of a substantial buying order. Metal Industries at 45s. are 3s. higher. Murex rose 5s. to 92s. 6d. Ward & Goldstone at 59s. are 1s. 6d. up. Automatic Telephone gained 1s. 9d. at 63s. 3d. Pye recovered ⅛ to 26s. 3d. Falk Stadelmann and Ericsson, 43s. 9d., are both ⅛ higher; so are Associated Electrical at 75s. Decca Record, 22s., De la Rue, 38s. 9d., and E.M.I., 19s. 9d., are a little easier. Johnson & Phillips, 70s. 6d., Switchgear and Cowans, 17s. 6d., and Allen West, 10s. 6d., are amongst others that have improved. Thomas Tilling shares reacted to 5 15/16.

G.E.C. Meeting

Buying of G.E.C. shares has been a feature of the industrial markets since the dividend and figures published on 24th September. From 85s. the price has not only recovered the ex-dividend deduction of about 1s. 9d. net, but has advanced further to 87s. 6d. Reports of the annual meeting held a week ago have attracted attention, chiefly on account of Sir Harry Railing's demonstration of the harm caused to industry by present rates of taxation. He gave no details but repeated the mention in the report of a further permanent increase in the company's capital at some future date.

Crabtree Electrical Industries

This company's year ends with the current month; the 10s. ordinary shares have lately been a good market, at 43s., in anticipation of the annual accounts, which were published last year towards the end of November. The quotation has come up from 41s. 3d. at the beginning of this month, and affords now a yield of £4 1s. 6d. per cent on the 17½ per cent distribution paid with impressive consistency for many years. Recent payments have included 7½ per cent in the form of bonus, and the last was covered nearly twice by net profits of J. A. Crabtree & Co., Ltd., the operating subsidiary.

Aron Electricity Meter

After a dull and inactive spell at around 48s. 6d., Aron Meter £1 shares have improved lately, without attracting much attention, to 50s., at which they still afford the conspicuously high return of 6 per cent. Two years ago, they stood £1 higher, but fell from grace with the return of a trading loss for 1946-7, the year of transition. Results for the two latest years have fully restored the position, and also the regular dividend rate of 15 per cent; but the shares continue to be quoted on a relatively high yield basis. This may have some connection with the chairman's report, last June, of reduced business in the home market, and the possibility that shortage of generating plant may limit for some time the number of new domestic consumers of electricity.

Miscellaneous Matters

London Electric Wire will not be paying the current year's interim dividend until the end of this month, whereas end-June is the usual date for the distribution. In consequence it is raising the payment from 2½ to 4 per cent. The ordinary shares, which seldom come into the market, are quoted at 47s. 6d. to yield £4 4s. 3d. per cent on last year's total of 10 per cent. A few hundred of the company's 7½ per cent preference are on offer at 39s. 3d. Aberdare Cables of South Africa 5s. shares have recovered to 17s. 9d., after their setback on news of the capital issue. Aerialite have hardened to 16s. 3d. since the full report was published. Hackbridge Cables, now 15s. 9d., still yield practically £1 per cent more than the return of £5 7s. 9d. per cent on Hackbridge and Hewittic at 11s. 1½d.

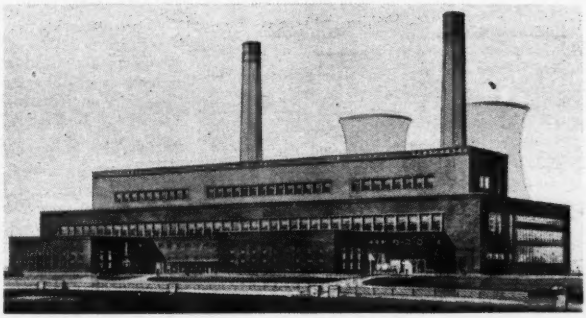
Announcement that the half-yearly dividend would be duly paid on Radio & Television Trust 6 per cent preference left the shares in question virtually unmoved at 15s. 6d. This seems to indicate that no particular anxiety had been felt about the payment, despite the recent tribulations of the industry, and the setback shown in the company's last-published accounts.

Electricity Supply

New Leeds Station. Arabian Electrical Development.

Gateshead.—Street Lighting.—The first stage of the Town Council's street lighting electrification scheme will be completed by the end of the year. The borough engineer has been instructed to prepare plans for the second stage which it is expected will be finished by the end of June. With the completion of this section all first class roads in the town will have been dealt with. The Council has had an interview with the regional officers of the Ministry of Health regarding electric street lighting on new housing estates. The Council proposed to erect 132 lamps, but the officials suggested a reduction to 87. The Council has pointed out that the work is urgent.

Leeds.—Skelton Grange Ceremony.—The foundation stone of the new Skelton Grange power station near Leeds was laid by the Lord Mayor (Ald. G. Brett) on 19th October. At a luncheon at the Queen's Hotel following the ceremony Mr. E. W. Bussey, C.B.E., member, British Electricity Authority, said that the Authority and Area Boards would spare no effort to resolve the problem of electricity shortage. When they had built sufficient stations to meet the continuously increasing demands he believed that the whole face of the country would be changed. They could then look forward to those things for which they had worked for so many years — happier homes and healthier industrial conditions. In the twenty years 1927-47 electricity supplies to undertakings in the Yorkshire Division increased more than four times, from 866 million to 4,075 million kWh, and the capacity of plants barely three times, from 462 MW to 1,238 MW. It was planned to increase the installed capacity to 2,000 MW by 1952.



Architect's conception of the new Skelton Grange power station being built near Leeds

Among others present were the Lady Mayoress (Miss M. Brett), Mr. W. M. Lapper (chairman, Yorkshire Electricity Board), Mr. J. D. Peattie (deputy chief engineer, B.E.A.), Mr. G. A. Vowles (controller, Yorkshire Division), Mr. C. T. S. Arnett (controller, N.W. Division) and Mr. F. Nicholls (Yorkshire Board and former city electrical engineer, Leeds).

The site of the station is at Knostrop, near the Corporation's sewage disposal works. Ultimately the station, which is estimated to cost £18 million, will contain six 60-MW hydrogen-cooled turbo-alternators, the capacity of the first stage, scheduled to be ready in 1952-53, being 180 MW. The nine steam generators will comprise six of 360,000 lb per hr and three of 550,000 lb per hr. Boiler operating conditions are to be 975 lb per sq in. and 940 deg F (900 lb per sq in. and 925 deg F at turbine stop valve).

Whittington (Northumberland).—Prospects of Supply.—The North Eastern Electricity Board is inquiring into the possibilities of supplying electricity to Whittington village and work on the scheme will commence as soon as possible.

Whitley Bay.—Street Lighting.—The Urban District Council has applied for sanction to borrow £2,958 for street lighting on the Seatonville and Seaton Sluice estates.

Overseas

Saudi Arabia.—Development Plans.—The Commercial Secretariat of the British Embassy at Jedda reports that the Saudi Arabian Government has for some time past been considering schemes for the electrification of the principal towns of the Hejaz—Mecca, Medina, Jedda and Taif. It is understood that the contracts for Taif and Jedda have already been awarded but those for Mecca and Medina are still pending. It seems likely that as soon as electric power is available in these towns the Government will turn its attention to the provision of street lighting. So far as is at present known, there is only one firm in Saudi Arabia representing a manufacturer of such equipment—an American company.

Next Week's Events

Monday, 1st November

BIRMINGHAM.—James Watt Memorial Institute, 6 p.m. I.E.E. South Midland Centre. "Analysis-Synthesis Telephony, with special reference to the Vocoder," by R. J. Halsey and Dr. J. Swaffield.

LONDON.—Savoy Place, W.C.2, 7 p.m. I.E.E. London Students' Section. Three short Papers on the Students' Sections summer tour to Switzerland.

NEWCASTLE-ON-TYNE.—At King's College, 6.15 p.m. I.E.E. North-Eastern Radio and Measurements Group. Lecture on "Great Personalities in the Fields of Electrical and Magnetic Measurements," by Prof. J. T. MacGregor-Morris.

SHEFFIELD.—Royal Victoria Hotel, 7 p.m. A.S.E.E. Sheffield Branch. "The Operation and Control of the Power Station and Primary Transmission System of the B.E.A.," by H. H. Cash.

Tuesday, 2nd November

CAMBRIDGE. — At Cavendish Laboratory, 8.15 p.m. I.E.E. Cambridge Radio Group. Discussion on "To what Extent does Distortion really matter in the Transmission of Speech and Music?" Opened by P. P. Eckersley.

ELTHAM.—The Castle Hotel, 8 p.m. A.S.E.E. South-East London Branch. "Electric Contactors and Automatic Control Gear," by S. H. Harding.

HAMMERSMITH.—Town Hall, 7.30 p.m. A.S.E.E. West London Branch. "Installation of Gas Turbines in Electric Power Stations," by B. Wood.

HARROW.—St. Hilda's Hall, 7.30 p.m. A.S.E.E. North-West London Branch. "Single- to Three-Phase Conversion Systems," by A. N. D. Kerr.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Joint meeting of the Measurements and Radio Sections of the I.E.E. "A Storage System for Use with Binary Digital Computing Machines," by Prof. F. C. Williams and T. Kilburn.

Grosvenor House, W.1, 6.30 p.m. Electrical Contractors' Association (London Branch). Annual dinner and ball.

Connaught Rooms, Gt. Queen Street, W.C.2, 12.45 for 1.15 p.m. Institute of Transport. Anniversary luncheon.

LOUGHBOROUGH.—The College, 6.30 p.m. I.E.E. East Midland Centre. "Factors Influencing the Design of High-Voltage Air-Blast Circuit-Breakers," by C. H. Flurscheim and E. L. L'Estrange.

LUTON.—Technical College, Park Square, 7.30 p.m. Luton Electrical Society. "The Heat Pump," by J. A. Sumner.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Centre. "The Application of Electricity to Horticulture," by C. A. Cameron Brown and E. W. Golding.

RUGBY.—Electricity Showrooms, 6.30 p.m. I.E.E. Rugby Sub-Centre. "Three-Dimensional Cathode-Ray-Tube Displays," by E. Parker and P. R. Wallis.

YORK.—Royal Station Hotel, 7 p.m. I.E.E. North Midland Centre. "Electric Traction on the Southern Railway," by C. M. Cock.

Wednesday, 3rd November

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. "Aids to Training—The Design of Radar Synthetic Training Devices for the R.A.F.," by G. W. A. Dummer.

MIDDLESBROUGH.—Cleveland Scientific and Technical Institute, 6.30 p.m. I.E.E. Tees-Side Sub-Centre. "The Application of Electricity to Horticulture," by C. A. Cameron Brown and E. W. Golding.

PORTSMOUTH. — City Council Chambers, Clarence Parade, 6.30 p.m. I.E.E. Southern Centre. "Load Dispatching and the Reasons for it, with special reference to the British Grid System," by A. R. Cooper.

ROMFORD. — At Mawney's Arms, 8 p.m. A.S.E.E. North-East London Branch. "Rythmatic Control."

Thursday, 4th November

CROYDON.—The Café Royal, 8 p.m. A.S.E.E. South London Branch. "Electric Resistance Welding," by H. E. J. Butler.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. "Some Projects Favourable to Direct-Current Transmission, and the Role of the British Electrical Industry in Relation Thereto," by F. J. Erroll and Lord Forrester. (Supply Section paper.)

Friday, 5th November

BIRMINGHAM. — Botanical Gardens, Edgbaston, 8 p.m. I.E.E. South Midland Students' Section. Annual dance.

M.E.B. Lecture Theatre, Paradise Street, 6 p.m. Illuminating Engineering Society, Birmingham Centre. Exhibition of lighting equipment developed since 1939.

BRISTOL.—Grand Hotel, 7 p.m. A.S.E.E. Bristol Branch. Paper by A. N. D. Kerr.

YORK.—Royal Station Hotel, 7.30 p.m. A.S.E.E. York Branch. "Carbon in Engineering," by G. Wilson Jenkins.

Saturday, 6th November

BARNSLEY.—Association of Mining Electrical and Mechanical Engineers (Yorkshire North-West Branch). "Metallurgy Applied to Mining Problems," by S. Francis.

CARDIFF.—At the South Wales Institute of Engineers, Park Place, 6 p.m. Association of Mining Electrical and Mechanical Engineers (South Wales Branch). "Non-metallic Screened Cables," by J. R. Cox.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specification will be printed and abridged are given in parentheses. Copies of any specification (2s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1939

A. C. COSSOR, Ltd., and J. E. Godeck.—"Electrical apparatus for indicating the positions of bodies." 31486. 5th December, 1939. (609703.)

1941

Metropolitan-Vickers Electrical Co., Ltd., A. Tustin and D. G. O. Morris.—"Electrical position-indicating apparatus." 6445. 19th May, 1941. (609705.)

1942

Metropolitan-Vickers Electrical Co., Ltd., Vickers-Armstrongs, Ltd., R. A. Polson and C. Dannatt.—"Control systems for power-driven movable objects." 4576. 7th April, 1942. (609804.)

Metropolitan-Vickers Electrical Co., Ltd., and A. Tustin.—"Control systems for power-driven movable objects." 13470. 24th September, 1942. (610008.)

1943

Metropolitan-Vickers Electrical Co., Ltd., Vickers-Armstrongs, Ltd., and R. A. Polson.—"Control systems for power-driven movable objects." 6743. 28th April, 1943. (609805.)

1944

Sperry Gyroscope Co., Inc.—"Smoothing and differentiating circuits." 908. 30th December, 1942. (609707.)

W. J. Polydoroff.—"Ultra-high-frequency inductors." 10174. 22nd May, 1942. (609708.)

British Thomson-Houston Co., Ltd.—"High-frequency control networks." 15101. 9th August, 1943. (609710.) "Fluorescent material." 15312. 14th August, 1943. (609711.)

Marconi's Wireless Telegraph Co., Ltd.—"Electron-discharge devices." 16107. 14th November, 1942. (609712.) "Electron-discharge devices." 23660. 6th March, 1942. (610018.)

Metropolitan-Vickers Electrical Co., Ltd., and C. Ryder.—"Control systems for power-driven movable objects." 17348. 11th September, 1944. (609808.)

British Thomson-Houston Co., Ltd., D. F. Welch and R. T. Coe.—"High-frequency ignition apparatus." 17405. 12th September, 1944. (610012.) "High-frequency electrical ignition systems." 17406. 12th September, 1944. (610013.)

Hanovia, Ltd., and G. W. Brench.—"Electric discharge lamps." 21568. 3rd November, 1944. (609809.)

Landis & Gyr, Soc. Anon.—"Resonance receiving relay." 22214. 16th November, 1943. (610016.)

Minneapolis-Honeywell Regulator Co.—"Electric automatic regulating systems." 25653. 22nd February, 1943. (609715.)

1945

Marconi's Wireless Telegraph Co., Ltd.—"Electron-discharge devices using a deflected beam." 5187. 6th March, 1942. (609717.)

Philco Radio & Television Corporation.—"Measuring apparatus for ultra-high-frequency energy." 7460. 31st December, 1943. (610024.)

General Electric Co., Ltd., A. H. McKeag and P. W. Ranby.—"Luminescent materials." 8056. 29th March, 1945. (610025.)

Akt.-Ges. Brown, Boveri & Cie.—"Arrangements for the heating of metallic work-pieces by electro-magnetic induction." 8241. 1st April, 1944. (609718.)

Sperry Gyroscope Co., Inc.—"Automatic frequency control of electrical oscillating systems and apparatus." 8623. 7th April, 1944. (609813.)

General Electric Co., Ltd., R. L. Breadner and C. H. Simms.—"Multi-conductor units and methods of manufacturing such units." 8840. 10th April, 1945. (610027.)

Metropolitan-Vickers Electrical Co., Ltd., F. H. Belsey and D. T. Broadbent.—"Control systems of the correspondence kind for movable members." 10457. 25th April, 1945. (610029.)

H. P. Barasch.—"High-pressure mercury vapour lamps." 13276. 28th May, 1945. (610031.)

Westinghouse Electric International Co.—"Reduction of molybdenum compounds." 14788. 7th January, 1943. (610033.)

Compagnie Générale d'Electricité.—"Telephone systems." 20055. 28th May, 1942. (610043.)

G. H. Scholes & Co., Ltd., G. H. Scholes and F. J. Pearce.—"Electric socket contacts." 23065. 7th September, 1945. (609724.)

Steatite & Porcelain Products, Ltd., Dubilier Condenser Co. (1925), Ltd., P. R. Coursey and L. J. Snell.—"Resonant electric circuits." 25565. 2nd October, 1945. (609824.)

H. C. Calpine, H. W. Pout and C. S. Wright.—"Radio echo systems." 26372. 9th October, 1945. (610049.)

Sangamo Weston, Ltd., and F. A. Sharp.—"Electrical measuring or controlling apparatus." 26519. 10th October, 1945. (610051.)

General Electric Co., Ltd., and E. S. Friedlander.—"Compensation of electric power transmission systems." 27741. 22nd October, 1945. (610054.) "Voltage control of and stabilization of electric power transmission lines." 29958. 9th November, 1945. (610061.)

A. W. Franklin.—"Structural unit for radio apparatus and method of making the same." 29531. 24th March, 1945. (610058.)

Compagnie Générale d'Electricité.—"Switch-stopping devices." 30981. 12th October, 1943. (610065.)

Farnsworth Television & Radio Corporation.—"Velocity modulated electron discharge device." 34441. 31st July, 1944. (609827.)

1946

General Electric Co., Ltd., and E. S. Friedlander.—"Grid-controlled rectifier systems." 378. 4th January, 1946 (610072.) "Balancing of rectifier systems." 379. 4th January, 1946. (610073.)

Eralite Manufacturing Co., Ltd., and E. J. Wray.—"Electric heating elements." 1208. 14th January, 1946. (610076.)

General Electric Co., Ltd., and E. P. George.—"Strain gauges." 1521. 16th January, 1946. (610077.)

Philco Radio & Television Corporation.—"Apparatus for switching ultra-high-frequency energy." 1767. 3rd August, 1944. (609830.)

General Electric Co., Ltd., H. C. Turner, J. Chamberlain and H. Reik.—"Dry-plate rectifiers." 3277. 1st February, 1946. (609831.)

Marconi's Wireless Telegraph Co., Ltd.—"Deflecting coil circuits." 3364. 30th May, 1942. (610081.) "Audio-frequency signalling and communication systems." 4572. 29th April, 1944. (609748.)

H. Barnes.—"Snap-action electric switches." 3368. 2nd February, 1946. (610082.)

J. P. Lindholm.—"Fuse switches." 3416. 21st October, 1944. (609745.)

Gesellschaft zur Forderung der Forschung auf dem Gebiete der Technischen Physik an der Eidgenossischen Technischen Hochschule.—"Measuring system with eddy-current damping means." 4074. 9th February, 1945. (610084.)

Telegraph Condenser Co., Ltd., P. A. Sporing and C. P. Johnson.—"Machine for stripping the insulation from the ends of insulated electric conductors." 6102. 27th February, 1946. (609834.)

A. C. Cossor, Ltd., A. H. A. Wynn and M. Franco.—"Television receivers." 7136. 7th March, 1946. (609839.)

Decca Record Co., Ltd., and W. J. O'Brien.—"Radio direction indicating systems and apparatus for measuring short intervals of time." 7152. 7th March, 1946. (610091.)

Marconi's Wireless Telegraph Co., Ltd.—"Television receivers." 7775. 12th March, 1945. (609755.)

C. H. Parsons, Ltd., and G. B. Handley.—"Electric switch plug-and-socket connectors." 8006. 14th March, 1946. (609840.)

Philips Lamps, Ltd.—" Circuits for electric discharge tubes." 8121. 19th July, 1941. (609845.) " Push-pull circuit arrangements for very short waves." 8122. 28th July, 1941. (609846.)

British Thomson-Houston Co., Ltd., S.-U.A. Choudhury and L. J. Clarke.—" Systems utilizing dynamo-electric machines for the remote transmission of angular motion and torque." 8161. 15th March, 1946. (609849.)

Kapella, Ltd., E. A. Cooke and A. H. Greenhalgh.—" Photoelectric pick-ups or scanning devices for copying machines." 8335. 18th March, 1946. (609856.)

Marconi's Wireless Telegraph Co., Ltd.—" Variable permeability tuning devices." 8345. 17th March, 1945. (609857.)

Philips Lamps, Ltd.—" Electronic amplifying systems." 8414. 5th August, 1941. (609858.) " High-frequency electrical circuits comprising discharge tubes." 8419. 5th August, 1941. (609859.) " Mixing circuit comprising a discharge tube." 8420. 8th August, 1941. (609860.) " Neutralized push-pull amplifiers." 8422. 30th June, 1941. (609861.)

Akt.-Ges Brown, Boveri & Cie.—" Electrical transformers." 8433. 21st March, 1945. (609616.)

Aktiebolaget Elektrolux.—" Condensers for absorption refrigerating apparatus." 8439. 17th April, 1945. (609618.) " Absorption refrigerating apparatus." 8440. 17th April, 1945. (609619.)

Standard Telephones & Cables, Ltd., A. H. Roche and T. W. Elliott.—" Thermionic valve circuits." 8480. 19th March, 1946. (609627.)

British Thomson-Houston Co., Ltd., and A. E. Tuppen.—" Identification sleeves for electric cables, conduits and the like." 8499. 19th March, 1946. (609630.)

British Thomson-Houston Co., Ltd., J. C. Lowson and R. V. Mills.—" Decorative lighting devices." 8500. 19th March, 1946. (609631.)

Compagnie Générale d'Electricité.—" Telephonic switch apparatus." 8552. 23rd October, 1941. (609649.)

Svenska Lasmutter Aktiebolaget.—" Time switches." 8562. 4th April, 1945. (609654.)

W. L. Tate and A. A. Oakes.—" Permutation electric switch." 8572. 20th March, 1946. (609656.)

Marconi's Wireless Telegraph Co., Ltd.—" Electrical connectors." 8607. 22nd March, 1944. (609666.)

Allmanna Svenska Elektriska Aktiebolaget.—" Means for exciting synchronous alternating-current machines through rectifiers." 8608. 9th April, 1945. (609667.)

Westinghouse Electric International Co.—" Carrier-current or other pilot-channel protective relay systems." 8624. 29th March, 1945. (609869.)

Babcock & Wilcox, Ltd., and R. E. Zoller.—" Tubulous vapour generating and heating units." 8632. 20th March, 1946. (609674.)

H. W. K. Jennings (First Industrial Corporation).—" Snap-action electric switches." 8669. 20th March, 1946. (609680.)

Landis & Gyr Soc. Anon.—" Motor-protection switch with quick release." 8689. 29th March, 1945. (Addition to 605418.) (609686.)

A. C. Sampietro and D. R. Robertson.—" Electro-magnetic clutches." 8694. 20th March, 1946. (609690.)

Chance Bros., Ltd., and A. Allison.—" Dynamo-electric machines." 8799. 21st March, 1946. (609767.)

Allmanna Svenska Elektriska Aktiebolaget.—" Electric condenser." 8873. 5th May, 1945. (Cognate application 8874/46.) (609779.) " Container for electric condensers." 8875. 5th May, 1945. (609780.)

General Electric Co., Ltd., W. F. Baker and J. W. Brown.—" Holders for arc-welding electrodes." 8887. 22nd March, 1946. (609782.)

R. P. H. Hinds.—" Securing devices particularly for electric lamps." 8891. 22nd March, 1946. (609783.)

Standard Telephones & Cables, Ltd.—" Electric signal wave translating circuits." 8931. 2nd April, 1945. (609788.) " Electric-pulse multi-channel signalling systems." 8932. 2nd April, 1945. (609789.)

Cornercroft, Ltd., and N. Rycroft.—" Adjustable electric standard lamps." 9062. 25th March, 1946. (609894.) " Adjustable electric standard lamps." 9063. 25th March, 1946. (609895.)

Thermat, Ltd., and F. W. Pare.—" Heating elements for electrically heated blankets, pads and the like." 9078. 25th March, 1946. (609897.)

A. E. Maskell and S. Tepper.—" Electric laundry irons embodying thermal switches." 9090. 25th March, 1946. (609899.)

London Electric Wire Co. & Smiths, Ltd., and A. B. Ashton.—" Method of treating precipitation-hardening copper alloys." 9099. 25th March, 1946. (609900.)

Siemens Electric Lamps & Supplies, Ltd., and W. G. Creasy.—" Tungsten for electric lamp filaments and for electrodes." 9108. 25th March, 1946. (609902.)

British Thomson-Houston Co., Ltd.—" Altitude indicators for aircraft." 9142. 28th March, 1945. (609909.)

Carr Fastener Co., Ltd., and C. W. Heath.—" Electrical contacts for holders for thermionic valves, plugs or like electrical devices." 9156. 25th March, 1946. (609917.)

Standard Telephones & Cables, Ltd., and E. C. Lee.—" Terminals for electrical components." 9164. 25th March, 1946. (609920.)

C. R. Fearey.—" Electric tumbler switches." 9198. 25th March, 1946. (609925.)

E. K. Cole, Ltd., and F. A. Inskip.—" Terminal plug for small gauge screened electric cables." 9236. 26th March, 1946. (609930.)

Mitchell Electric, Ltd., and W. R. M. Mitchell.—" Heating elements of the rod type for use with electrical heating appliances." 9243. 26th March, 1946. (609933.)

D. Addy.—" Rotary electric machine." 9253. 26th March, 1946. (609935.) " Stator units of rotary electrical machines." 9254. 26th March, 1946. (609936.)

Foster Transformers & Switchgear, Ltd., and R. I. Bagnall.—" Automatic electric circuit-breakers." 9261. 26th March, 1946. (609938.)

Igranic Electric Co., Ltd.—" Electric motor control systems." 9327. 26th March, 1945. (609950.)

Metropolitan-Vickers Electrical Co., Ltd., and S. E. Pritt.—" Direct current electric traction equipments." 9332. 26th March, 1946. (609952.)

British Thomson-Houston Co., Ltd.—" Grinding machines." 9349. 31st March, 1945. (609957.)

Walsall Conduits, Ltd., and E. Gough.—" Terminal contacts or sockets of electric switches and plug-and-socket couplings." 9399. 27th March, 1946. (609965.)

Bayliss, Jones & Bayliss, Ltd., and D. R. Lewis.—" Brackets for supporting the insulators of telegraph wires or the like." 9402. 27th March, 1946. (609966.)

Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—" Recording and reproduction of sound." 9413. 25th July, 1941. (609969.)

Philips Lamps, Ltd.—" Circuit-arrangements for linearly varying a thermionic reactance by means of a periodic control voltage." 9419. 17th September, 1941. (609970.)

British Thomson-Houston Co., Ltd.—" Centrifugal compressors." 9426. 31st March, 1945. (609971.)

General Electric Co., Ltd., D. J. Jones and S. V. Williams.—" Combustible alloy fillings in photographic flash-light lamps." 9445. 27th March, 1946. (609976.)

General Electric Co., Ltd., and C. R. Dunham.—" Electrical inversion systems." 9446. 27th March, 1946. (609977.)

J. Lucas, Ltd., and J. A. Laird.—" Electromagnetic clutches." 9460. 27th March, 1946. (609979.)

W. W. Constantine (General Motors Corporation).—" Electric generator voltage regulator." 9479. 27th March, 1946. (609984.)

J. A. Crabtree & Co., Ltd., W. E. Hill and T. D. G. Wintle.—" Mounting of electric binding posts, terminals or the like." 9490. 27th March, 1946. (609988.)

Hazeltine Corporation.—" Antennas." 9520. 30th March, 1945. (609993.)

H. T. Aspinall and I. J. Maguire.—" Electrical switches suitable for impulse transmission." 9536. 14th April, 1945. (609997.)

Marconi's Wireless Telegraph Co., Ltd.—" Radio direction finders." 9547. 28th March, 1945. (610002.)

Pulsometer Engineering Co., Ltd., and A. V. Price.—" Centrifugal pumps." 9584. 28th March, 1946. (610098.)

Watford Electric & Manufacturing Co., Ltd., and A. C. Gascoine.—" Electrical insulating materials." 9899. 31st May, 1946. (Divided out of 11406/44.) (609903.)

Ideal Home Exhibition

The 26th *Daily Mail* Ideal Home Exhibition will be held at Olympia from 1st to 26th March, 1949.

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Devizes.—5th November. R.D.C. Electrical installations at cottages in four parishes. Building surveyor, Browfort.

Dundee.—27th November. Corporation Works Department. Sewage pumps, electric motors, and switching gear at Linlathen pumping station. City engineer, 21, City Square.

Hull.—2nd November. Corporation. Electrical installations in 70 houses. Town clerk, Guildhall.

India. — BOMBAY MUNICIPALITY. — Transformers and switchgear for the Vaitana-cum-Tansa water supply scheme (95/11 kV and 11 kV/440 V). (E.P.D. 38805/48. Com./1118/I.D.1.)*

New Zealand.—WELLINGTON.—8th February. State Hydro-Electric Department. 7·5-MVA transformer bank. (E.P.D. 42223/48. Com./1156/I.D.1.)*

St. Neots.—3rd November. R.D.C. Wiring of 14 houses, Great Paxton. M. Fawcett, surveyor.

Salford.—16th November. North Western Electricity Board (No. 1 Sub-Area). Complete electrical installations in 144 houses. (See this issue.)

South Africa.—CAPETOWN.—24th November. City Electricity Department. Transformers. (E.P.D. 41973/48. Com./1155.)*

Wallasey.—9th November. Town Council. Electric lighting, heating and power installation in connection with extensions and alterations to Sea Training Homes, Withens Lane, to provide temporary special school. Director of education, Town Hall.

* Specifications may be inspected at the Export Promotion Department, Thames House North, Millbank, S.W.1.

Orders Placed

Birmingham. — Corporation. Accepted. Electrical installation work, Bilberry Hill Civic Restaurant, Lickey—Stuart Electrical, Ltd.; World's End Lane School, Quinton—J. H. Payne (Birmingham), Ltd.; Mapledene Road School, Sheldon—Thomas Glover (Electricals), Ltd.; Blakenhale Road Junior School, Yardley—Reynolds & Bradwell, Ltd.; Tile Cross School, Sheldon—Gordon Hughes (Electrical), Ltd.; Aldridge Road School, Great Barr—H. Pratt, Ltd. Sound amplifying equipment in public parks.—Walker Brothers (Electrical Engineers), Ltd.

Bradford.—Corporation. Accepted. Work in connection with the rewiring of houses, Bierley Housing Estate (£3,269).—Roberts & Jowett, Ltd.

Norfolk.—County Council. Accepted Electrical work (mainly fluorescent lighting) in connection with the adaptation of building for County Architect's Department (£245).—Beaven & Sons, Ltd.

Sunderland.—Town Council. Accepted. Supply of 290 electric cookers (£5,597).—North Eastern Electricity Board.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Abertillery.—Permanent houses (86), Rose Heyworth site; A. Gordon Jones, surveyor to U.D.C., Council Offices.

Bath.—Rebuilding Christopher Hotel, High Street (£90,000); Davis Estates, Ltd., Kilburn High Road, London, N.W.6.

Birmingham.—Factory for Disabled Persons Employment Corpn., Ltd.; Wilson Lovatt & Sons, Ltd., builders, Clarence Street, Wolverhampton. Estates Department offices at Summer Row (£206,565); H. J. Manzoni, city architect, the Council House.

Bridge-Blean.—Houses (40), Barham site (£57,475), for R.D.C.; G. Parker & Sons, builders, Peckham, London, S.E.

Bromley.—Flats (66), Bourne Way, Hayes, and flats (30), Tylney Road; borough engineer, Municipal Offices.

Burton-on-Trent.—Houses (76); borough engineer.

Cardiff.—New institute and workshops, for Cardiff Institute for the Blind; C. F. Jones, architect, 67, Queen Street.

Carluke (Lanark).—Ice cream factory; James Henderson, 15, Hamilton Street.

Chadderton.—Primary school, Roman Road, for R.C. authorities; Rev. P. Tighe, P.P., St. Herbert, Broadway.

Dagenham.—Flats (239), Heathway Farm and Heathway Park estates, for T.C.; Norman & Dawbarn, architects, 5, Gower Street, W.C.1.

Darlington.—"Easiform" houses (100) for T.C.; J. Laing & Sons, Ltd., builders, Dalston Road, Carlisle.

Doncaster.—Operating theatres and fracture clinic, Royal Infirmary; Morris Thompson, architect, 16, South Parade.

Droitwich.—Houses (28), Stalls Farm estate, for T.C. (£36,823); Structo, Ltd., builders,

1881, Pershore Road, King's Norton, Birmingham, 30.

East Boldon.—Factory for Insulating Products, Ltd., Cleadon Lane; plans by company's own staff.

Enfield.—Factory; Ferguson Radio Corpn., Ltd., Great Cambridge Road.

Exeter.—Biological laboratories for University of the South-West; E. Vincent Harris, architect, 19, West Eaton Place, London, S.W.1.

Gateshead.—Addition to factory, North-Eastern Trading Estates, Ltd., for North-Eastern Wires, Ltd.: W. Hall, Ltd., builders, Derwentwater Road.

Golborne.—Houses (50), Derby Road, and shops and flats, Naylor Road, for U.D.C.; A. Clough, surveyor, Council Offices, Lowton St. Mary's, near Leigh.

Houghton-le-Spring.—Houses (110) for U.D.C.; J. Laing & Sons, Ltd., builders, Dalston Road, Carlisle.

Hounslow.—Houses (32), Worton Court estate; Arthur Watson, Ltd., builders, Bridge Road.

Hulme.—Extensions to printing works for A. Brook & Sons, Ltd.; Major R. Bull, architect, 73, High Street, Cheadle, Cheshire.

Ilford.—Permanent houses (62), Maypole estate, Barkingside; borough engineer, Town Hall.

Leicester.—Houses (250), New Parks estate, for T.C.; housing architect, Charles Street.

Limehurst.—Houses (40), Waterloo estate, Oldham Road, for R.D.C.; Bower, Moffatt & Co., Ltd., builders, 17, Park Street, Manchester, 3.

London.—CITY.—Office block, Cannon Street, for Exchange Telegraph Co., Ltd.; Whinney, Son & Austen Hall, architects, 37, Norfolk Street, W.C.2.

GREENWICH.—Flats (174) (in seven blocks), Spring site, for T.C.; borough engineer.

Manchester.—Factory, Buxton Street, for Merry & Co., Ltd.; F. Whiteley, architect, Bank Buildings, Wilmslow, Cheshire.

Middlesbrough.—Houses (48), Thorntree estate; J. A. Kenyon, borough engineer.

Installation of electric lighting and power at St. Mary's R.C. School; education architect, Woodlands Road.

Newcastle-on-Tyne.—Offices and workshop, Pitt Street, for R. W. Bell & Co. (Builders), Ltd., Barrack Road.

Newcastle (Staffs.).—Secondary school, Bradwell estate, and primary school, Hempstalls Farm estate; P. Normanton, schools architect, Municipal Offices.

Houses and maisonettes for T.C. (£24,640); H. Stubbs, builder, Liverpool Road.

Additions to Enderby Mills, John Hammond (1922), Ltd.; Hollins, Jones & Oldacre, architects, Lloyds Bank Buildings.

Newton Heath.—Bottling stores at brewery, Monsall Road, for Wilsons Brewery Co., Ltd.; M. Jennings, architect, 116, Victoria Street, London, S.W.1.

Norwich.—Houses (76), Earlham estate (£104,459), for T.C.; R. G. Carter, Ltd., builders, Drayton.

Nuneaton.—Houses (192), Caldwell estate; G. Ashton, borough surveyor, Council House.

Oldham.—Houses (50), Limeside estate, for T.C. (£106,383); G. Wimpey & Co., Ltd., builders, Tilehurst Lane, Denham, Uxbridge.

Plymouth.—Departmental stores, George Street and Royal Parade, for E. Dingle & Co., Ltd., The Esplanade; Thomas S. Tait, architect, 10, Bedford Square, W.C.1.

Houses (400) (£467,734) for T.C.; Gee, Walker & Slater, Ltd., builders, Brook House, Park Lane, London, W.1.

Rebuilding Church of Holy Redeemer; W. C. Mangan, architect, 18, Guildhall Street, Preston.

Ramsgate.—County primary school, Manston Road, for Kent E.C.; Howard W. Lobb, architect, 20, Gower Street, W.C.1.

Rugby.—Houses (102), Deepmore Road and Bilton Road site (£130,596), for T.C.; Morris Jacombs & Son, Ltd., builders, Hobmoor Road, Birmingham, 10.

Scarborough.—Houses (58) on the High Eastfield estate; H. V. Overfield, borough engineer.

Sedgefield.—Houses (60); R.D.C. housing architect, Council Offices, Sedgefield.

Shrewsbury.—Residential wing, quarters for teaching and domestic staff, instructional block, laundry rooms, kitchen, etc., at College of Domestic Science and Dairywork, Radbrook, for C.C.; Willink & Dodd, architects, Cunard Buildings, Liverpool, 3.

South Shields.—School at Marsden Road; Gustavus Bailey, Ltd., King Street.

School at Harton Downhill; Gustavus Bailey, Ltd., King Street.

Strood.—Permanent dwellings (34) for R.D.C.; D. P. Terry, surveyor, Council Offices, Frindsbury Hill.

Warrington.—Factory, Hawleys Lane and Winwick Road; W. Strange (Engineers), Ltd., Bowes Street.

Watford.—Settlement, Garston, for British Red Cross Society; Norman & Dawbarn, architects, 5, Gower Street, W.C.1.

West Bromwich.—Factory, Bull Lane; Smith & Morgan (West Bromwich), Ltd., Braybrook Street.

Workington.—Houses (24), Westfield estate (£31,056); Workington Iron & Steel Co., Ltd., Moss Bay.

Additions to Derwent Works, Moss Bay; United Steel Co., Ltd.

Worthing.—Residential Hotel, Palatine Road; Henty & Constable (Brewers), Ltd., Chichester.